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1956 REPORT

SUGAR BEET RESEARCH 900

Conducted by

SUGAR CROPS SECTION, FIELD CROPS RESEARCH BRANCH

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

In cooperation with

BEET SUGAR DEVELOPMENT FOUNDATION

and Field Test, Tela Falle, Icale

COMPANY MEMBERS

This report gives results of cooperative investigations conducted by the Sugar Crops Section, Field Crops Research Branch, ARS, USDA, under Memorandum of Understanding with the Beet Sugar Development Foundation. The report is distributed to members of the cooperating organizations only and does not constitute publication. It should not be cited as reference. The research findings given in this report have not been released for publication.

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FOREWORD

In the past the results of the phases of sugar beet research conducted by the Sugar Crops Section, with the support of the Beet Sugar Development Foundation, have been presented separately according to projects set up by the Foundation. It is thought that the project reports would be more useful if combined into one report by the Sugar Crops Section.

In the preparation of this report, no concerted effort has been made to separate accomplishments pertaining specifically to objectives of a Foundation project from results obtained in a broader program of related research conducted by the Sugar Crops Section. Since the Foundation projects cover several important fields of investigation, the combined report encompasses most of the applied research on sugar beet improvement conducted by Sugar Crops Section in 1956.

The results of field tests that were conducted by members of the Agricultural Research Department of Sugar Companies and by the Farmers and Manufacturers Beet Sugar Association, to evaluate groups of varieties sent out by the Sugar Crops Section, have contributed greatly to this report. The results of these cooperative tests have made possible informative tables summarizing performances of varieties in the region of adaptation.

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PART I

RELEASE OF INBREDS, HYBRIDS, AND ELITE SEED
OF SYNTHETIC VARIETIES OF SUGAR BEETS

Proposals by

SUGAR CROPS SECTION

Acceptances by

BEET SUGAR DEVELOPMENT FOUNDATION

Participation by

COMPANIES IN SEED PRODUCTION

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UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

FIELD CROPS RESEARCH BRANCH BELTSVILLE, MARYLAND

May 31, 1956

To:

The Beet Sugar Development Foundation

From:

Sugar Crops Section

Subject:

Release of Breeder Seed and Elites developed in the breeding research conducted by the Sugar Crops Section in cooperation with:

The Beet Sugar Development Foundation
Farmers & Manufacturers Beet Sugar Association
Colorado Agricultural Experiment Station
Michigan Agricultural Experiment Station
Minnesota Agricultural Experiment Station
New Mexico Agricultural Experiment Station

Under provisions of a Memorandum of Understanding, the products of breeding research of Sugar Crops Section are being offered for release to The Beet Sugar Development Foundation. According to Sections C-5 and C-6, it is mutually agreed that "releases of Breeder Seed, Elites, hybrids, and varieties will be released to the Foundation or, if approved by the Foundation, to a given member company or group of companies. This provision recognizes that to gain time in bringing improved varieties into use, production of Elite seed of strains, hybrids, and varieties needs to take place prior to or concurrently with evaluation tests. Seed stocks not found especially advantageous for future work on advice of the Sugar Crops Section may be disposed of as their quality or quantity warrants."

"The Sugar Crops Section shall, on its request, have returned to it without cost an amount of seed of a strain or variety equal to that furnished originally to the Foundation for increase and also such additional amounts (not to exceed 50 percent or 100 pounds--whichever is the smaller) as needed for experimental purposes."

It should be pointed out that for the most part the seed of the releases will come from current productions. Although a careful estimate of seed available in August 1956 has been given for each proposed release, it must be kept in mind that estimates were made far in advance of harvest and may not agree with actual production. Therefore, it may be necessary to reduce the size of the seed plot, due to lack of sufficient seed. However, plans should be made on the assumption that sufficient seed of acceptable quality will be available by August 1 to plant plots of the size indicated.

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SOME TRENDS IN THE BREEDING RESEARCH OF THE SUGAR CROPS SECTION AND THE TYPE OF RELEASES TO BE EXPECTED IN THE FUTURE

Monogerm seed types will be emphasized in all breeding research by the Sugar Crops Section. The monogerm strains available today show great advance over the original SLC 101 found by Dr. Savitsky in 1948. Monogerm hybrids are now available for some areas, which are as productive as the multigerm varieties they are replacing. Obviously, improvement over these first hybrids can be expected in the future with the development of superior parental strains. Effort will be made to develop a wealth of inbred lines, Type O strains and their male-sterile equivalents suitable for all sugar beet areas. Various combinations of these will be made and given preliminary evaluation as a basis for suggesting hybrid combinations of the releases to the Foundation. In some areas of breeding research, the polycross breeding method will be used. Clones and inbred lines of superior mothers, as indicated by the performance of the polycross progeny, will be used to synthesize productive varieties. The products of breeding research and hybrid combinations of releases giving outstanding performances will receive a "US" designation.

The breeding research at Salt Lake City Sugar Crops Field Laboratory is well known from past results. There has been a shift in emphasis from multigerm to monogerm breeding, which is illustrated by the fact that all of the proposed releases in 1956 are monogerm. In addition to applied breeding, fundamental research will be continued on male sterility in sugar beets as a means of bringing about complete hybridization in seed production. The intriguing schemes of producing 3-way and 4-way crosses as practical means of utilizing the vigor of hybridity will be pursued further. The results of these investigations will be of interest to all members of the Foundation, whether or not the releases from Sugar Crops Section are being utilized in their commercial seed production.

The breeding research at the U. S. Agricultural Research Station, Salinas, California, will continue to give rise to inbred lines and to Type O strains and their male-sterile equivalents, which are resistant to bolting, curly top, downy mildew, and rust. Productions with these characteristics will be released to the Foundation with proposals for their utilization in hybrid combinations.

Selections made in the Imperial Valley from some of the well-known varieties, such as US 56/2 and US 75, have shown special adaptation to the peculiar conditions found in the region. Strains from these selections are not proposed for release this year, but it can be expected that they will be available in 1957 or later.

The applied breeding research of the Sugar Crops Section at the Plant Industry Station, the Michigan Agricultural Experiment Station, and the Minnesota Agricultural Experiment Station, will emphasize the development of monogerm

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inbreds and hybrids that are resistant to leaf spot and black root. In 1956, approximately two-thirds of the experimental area in sugar beets on the Plant Industry Station is devoted to monogerm seed. The root selections in 1956 for seed production in 1957 will be almost exclusively from monogerm material, with emphasis given to seedling vigor, rate of emergence, and productivity under exposure to leaf spot and to black root. Although Type O strains and their male-sterile equivalents will be offered for release us they become available, the possibility of developing synthetic varieties from clones and self progenies of superior monogerm mothers, as revealed by the polycross method, can be expected. The breeding research of the Sugar Crops Section at the Michigan Agricultural Experiment Station and the Minnesota Agricultural Experiment Station will show similar trends to those indicated for the Plant Industry Station.

Progress is being made in the development of autotetraploid sugar beets which will be used as parental material in the production of triploids. Research of this type has been under way at the Salt Lake City Station by Dr. Helen Savitsky and at the Salinas Station by Dr. McFarlane. Similar work is now being initiated at the Plant Industry Station by Dr. Coe. At this time, when there is a shift from multigerm to monogerm strains, it seems opportune for more emphasis to be placed on the evaluation of polyploidy as a means to new levels of productivity in the sugar beet. It can be expected that releases will be available of monogerms tetraploids and possibly their male-sterile equivalents in the near future.

Breeding for keeping quality in stored roots will be continued at the Fort Collins Station by Mr. Gaskill in cooperation with Mr. Stout of the Salt Lake City Station. This appears to be a very promising field of research. There is the possibility of developing phases of locally adapted varieties that are resistant to the factors causing preprocessing losses. In 1955 there was a release of a strain resistant to the pathogens causing storage rots. Unfortunately, this was lost due to wintering injury, but it is being resynthesized for release in 1957.

Breeding for resistance to virus yellows and to nematodes is well under way at the Salinas Station. Since resistances to these diseases are our most difficult problems, we cannot expect immediate production of resistant strains. Screening tests with the cultivated forms of beet have not shown great promise of resistance to the nematode. However, certain wild species of the genus Beta are known to be resistant to the sugar beet nematode and other wild forms show promise in virus yellows resistance. A definite effort is being made to transfer the genes for resistance in the wild species of Beta to productive types of sugar beets.

These statements are not intended to cover the entire research program of the Sugar Crops Section but rather to give the trends in breeding research as a basis of releases that may be expected in the future. production has an reminished to seed upon on high room in 1984, in 1984, if the diddents of the apportunited one in super mount of the seed of the see

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Current Designation, Seed Available, and Brief Description for each Proposed Release

I. U. S. Sugar Crops Field Laboratory, Salt Lake City, Utah (All releases developed by Dr. V. F. Savitsky, except SL 122-0 and SL 122 MS)

1. Self-Sterile Monogerm

SLC 15 15 to 20 pounds (estimate)

Curly top resistant and same as SLC 15 supplied in 1955. Included because of near loss of planting in Oregon, 1955-1956.

SLC 18 (Code 5076). . 3 to 5 pounds (estimate)

From hybridization to curly-top-resistant strain SL 111, Type 0.

SLC 19 3 to 5 pounds (estimate)

From hybridization to curly-top-resistant variety US 35/2.

SLC 20 (Code 8370). . 1 pound (estimate)

From hybridization to Klein E.

SLC 22 (Code 8337). . 1 to 2 pounds (available)

From hybridization to Klein Z.

SLC 24 1 pound (estimate)

 F_3 hybrid from crosses of curly-top-resistant monogerm to multigerm LSR US 201.

2. Self-Fertile Monogerm

SLC 119 (Code 721). . 1 to 2 pounds (estimate)

Same as SLC 119 supplied in 1955. Leaf spot resistant in tests by J. O. Gaskill. From US 216 X SLC 101 mm.

SLC 121 (Code 435). . 3 to 5 pounds (available)

Good in curly top resistance. F_{l_1} lines (US 75 X SLC 600 mm). In Breeders' Forum cooperative inbred test of 1955 as FI-197.

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SL 122-0 4 to 5 pounds (estimate)

High in curly top resistance. Backcross from seven lines; 50 percent (Mendelian male-sterile). SL 122-0 (a) may be used for hybridization to other mm (monogerm) lines, and (b) it may be grown by itself in an isolation with the aa (male-sterile) plants being tagged for separate harvest to give an additional backcross.

3. Male-Sterile Monogerm

SL 122 MS 4 to 5 pounds (estimate)

Cytoplasmic male-sterile, high in curly top resistance. From hybrid to seven lines. May be used for hybridization with established multines.

II. U. S. Agricultural Research Station, Salinas, California. (All releases developed by Dr. J. S. McFarlane.)

1. Breeder Seed for the Production of Elite

NB 4 5 pounds (estimate)

This multigerm inbred has been selfed for seven generations. It has excellent bolting and downy-mildew resistance but is susceptible to curly top. It has shown tolerance to the yellowing phase of virus yellows and possesses excellent combining ability. Unfortunately, the inbred lacks vigor and is not Type 0. For these reasons, it is recommended for use as one of the parents in a 4-way hybrid. A combination such as (MS of NB 1 X NB 3) X (C366aa X NB 4) is suggested. A hybrid with a similar parentage was tested in 1955. This hybrid yielded well and had good resistance to curly top and bolting. NB 4 has been found to be rather late in flowering. In the 1956 Oregon seed plots, it is about one week behind C366aa. Concurrent flowering is being achieved by cutting back C366aa.

C6554M 3 pounds (estimate)

This is an F_1 hybrid between the Mendelian male sterile of C366 and NB μ . C366 is a bolting-resistant selection from US 35/2. This F_1 combination can be used as the male parent in a μ -way hybrid such a is described above.

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C6554M2 3 pounds (estimate)

This is an F_1 hybrid between the Mendelian male sterile of US 75 and NB 4. It can be used as the male parent in a 4-way hybrid. C6554M2 should be more resistant to mildew than C6554M1 but may be a little lower in sucrose content.

C688M 5 pounds (estimate)

A Mendelian male sterile of US 75 which will segregate approximately 50% aa. Its bolting resistance should be good but will be somewhat inferior to that of US 75. For use in producing 4-way hybrids.

C681M 5 pounds (estimate)

A Mendelian male sterile of C366 (Bolt. res. US 35/2) which will segregate approximately 50% aa. For use in producing 4-way hybrids.

C585 and C585HO . . . 1/2 and 3/4 pound, respectively (available)

These are bolting-resistant selections made from C361 and C361HO at Salinas in 1955. Seed was not available in time to determine the relative bolting resistance of these selections but it should be markedly improved over that of the parent strains. These selections may serve as potential replacements for C361 and C361HO which are now being used to produce commercial hybrids.

C586 3 pounds (available)

A bolting-resistant selection from C366 (bolt. res. US 35/2) made at Salinas in 1955. We predict that C586 will be equal or superior to US 75 in bolting resistance. It is suggested as a possible replacement for C366 as a top-cross parent.

C671 10 pounds (estimate)

This is a composite of Type O selections made at Salinas from US 75, US 22/4, and US 56/2. A total of 17 plants which have been found to be Type O, or nearly Type O, are represented. C671 is expected to have moderate resistance to both curly top and bolting. This strain will be of value to the breeder as a source of Type O germ plasm. Not all the progeny will be Type O, but the percentage of Type O plants should be very high as compared to unselected material.

NB 1 and MS of NB 1 . . . 25 and 50 pounds, respectively (available)

This bolting-resistant inbred and its male-sterile equivalent have been released previously. Additional seed is on hand in the event it is needed.

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NB 3 and MS of NB 1 X MU 3 . . . 8 pounds of each (available)

These two breeders' strains were released last year, but information on their performance was lacking so no increases were made. The MS of NB 1 X NB 3 performed exceptionally well in the 1955 variety tests in most California districts, with the exception of those subject to downy mildew. It also heads the list of 25 hybrids and selections included in the 1956 Brawley test. The hybrid has excellent curly-top and good bolting resistance but lacks mildew resistance. The progeny of this F₁ is entirely male-sterile, so it can be used as the female parent in a 3- or 4-way hybrid. The MS of NB 1 X NB 3 is recommended as the female parent in a hybrid with a high sugar strain such as C366. It is doubtful whether either the MS of NB 1 or NB 3 possesses sufficient vigor to warrant its use in a single cross commercial hybrid.

2. Elite Seed for the Production of Commercial Hybrids

MS of NB 1 X NB 2 200 pounds (available)

This F_1 hybrid is now in use in the production of 3-way hybrids. As much as 200 pounds of additional seed is available, if needed.

III. Breeding for improvement in leaf spot and black root resistance:

Plant Industry Station, Beltsville, Maryland Michigan Agricultural Experiment Station, East Lansing, Michigan Minnesota Agricultural Experiment Station, Southern Substation, Waseca, Minnesota

1. Breeder Seed - Multigerm

SP 55206-0 2 pounds (available)

From backcross (US 225 MS X US 201) X US 201. Leaf spot excellent, and root yield should be better than US 201B, but performance will be determined from current tests. Thought to be of value as a pollinator.

SP 5517-0 2 pounds (available)

A synthetic related to US 400 and US 401. Breeder Seed produced from selections made from outstanding polycross progenies under exposure to severe leaf spot and to moderate black root.

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2. Elite Seed - Multigerm

Previous releases in need of further increase also are presented. All Elites are related to US 400 and US 401 but they should be superior to these varieties in disease resistance and in productivity. Although these multigerm Elites may never give rise to commercial varieties, they have great potential value as pollinators and as genetic material. Seed production from small acreages under contract will be acceptable if isolation can be provided. Otherwise, fractional-acre plots (0.1 A.) should give sufficient seed for present needs.

SP 55600-01 34 pounds (available)

A broad base synthetic from selections for resistance to leaf spot and black root. SP 55600-Ol is under test in Michigan, Ohio, and Colorado as Entry No. 10 in the 12 X 8 Field Test.

SP 5611-0 30 pounds (estimate)

An overwintering increase of SP 5511-0 on the Plant Industry Station. Breeder Seed 5511-0 was better than US 400 or US 401 in leaf spot resistance. Since it was synthesized from clones and selfed progenies of mothers producing superior polycrosses, excellent performance is expected.

WC (6200) Increase SP 5510-0 . . 30 pounds (estimate)

An overwintering increase of SP 5510-0; see Sprick, 1955-1956, West Coast. Approximately 20 pounds of the West Coast 1956 production should be held in reserve for 1957 field tests. SP 5510-0 is similar to SP 5511-0 (see preceding entry) in breeding history, with emphasis placed on high sucrose percentage.

WC (6201) Increase SP 5512-0 . . 30 pounds (estimate)

An overwintering increase of SP 5512-0; see Bernardi, 1955-1956, West Coast. Approximately 20 pounds of the West Coast 1956 production should be held in reserve for 1957 field tests. SP 5512-0 is similar to SP 5511-0 (see preceding entry) in breeding history, with emphasis placed on root yield.

3. Monogerm - All Pollen Fertile and not Self Sterile

SP 557-0 2 pounds (estimate)

Breeder Seed SP 557-0 will represent a pooling of seed of outstanding polycross progenies under test on the Plant Industry Station, with emphasis on seedling vigor, rate of emergence, and freedom from off-types of monogermness.

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SP 558-0 2 pounds (estimate)

Breeder Seed SP 558-0 will represent a pooling of seed of outstanding single plant progenies recovered from an additional backcross in which plants of black-root-resistant varieties were used as the recurrent multigerm genotype.

SP 566-0 2 pounds (estimate)

From selected roots of best monogerm progenies under exposure to severe leaf spot and moderate black root.

IV. Breeding for Leaf Spot and Curly Top Resistance:

Plant Industry Station, Beltsville, Maryland U. S. Sugar Crops Field Laboratory, Twin Falls, Idaho
New Mexico Agricultural Experiment Station, State College, New Mexico

SP 554-0 1 pound (estimate)

From selection under severe curly top exposure at State College, New Mexico, in US 104.

SP 555-0 l pound (estimate)

From selections made under severe curly top exposure at State College, New Mexico, in SP 5350-0 which was synthesized from single plant progenies outstanding at Jerome, Idaho. This line of breeding carries some resistance to black root in addition to its improvement in leaf spot reaction over US 104.

SP 5651-0 l pound (estimate)

From selected roots of outstanding polycross progenies of SP 5551in curly top resistance (Jerome, Idaho) and in leaf spot and black root resistance (Plant Industry Station). This is a very promising production which combines resistances to three major diseases. Although multigerm, it should be of value as a pollinator and as genetic material.

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UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE FIELD GROPS RESEARCH SHAHCH BELTSVILLE, MARYLAND

July 20, 1956

SUPPLEMENT to Memorandum of May 31, 1956 to the Beet Sugar Development Foundation concerning the release of Breeder Seed and Elites developed in the breeding research conducted by the Sugar Crops Section and Cooperators. This supplement gives actual seed distribution of the proposed releases in Sections III and IV of the memorandum.

III. Breeding for improvement in leaf spot and black root resistance:

All overwintering productions under Section III will be made by the West Coast Beet Seed Company. The seed for each production has been shipped to Mr. Sam C. Campbell, except the special distributions which have been indicated for each item.

Item 1. SP 55206-0
Seed supplied - 1.0 pound
Plot size - 0.1 acre

Description. -- Excellent in leaf spot resistance and should be superior to US 201B in root yield. SP 55206-0 was produced from selections made in backcross (US 225 MS X US 201) X US 201. This release is thought to be of value as a pollinator that will contribute high leaf spot resistance to the offspring.

(Special seed distribution: 30 grams each to Great Western Sugar Company and Utah-Idaho Sugar Company.)

Item 2. SP 5517-0

The proposed release of 1.0 pound of SP 5517-0 has been withdrawn due to poor showing of this Breeder Seed in plot tests of 1956 at the Plant Industry Station.

> Item 3. SP 55600-01 Seed supplied - 16.0 pounds Plot size - 1.0[±] acre

Description. -- A broad base synthetic from the basic stock that gave US 400, and specifically from SP 52108-0. An increase of SP 52108-0 was included in 8 X 8 tests of 1955 - Accession 1353. Currently SP 55600-01 is under field test in Michigan, Ohio, and Colorado as Entry 10 in 8 X 12 Evaluation Tests. The indication of 34 pounds of seed available on 5/31/56 was an error. Only 16 pounds are available as Item 3.

(Special seed distribution: 50 grams to Great Western Sugar Company)

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July 20, 1956

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New 1. SP 55206-0 Seed sapplied - 1.0 point size - 0.1 ears

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Item 3. 55 55600-01 Seed supplied . 16.0 pending Flot size - 1.01 acres

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Seed supplied - 30.0 pounds
Plot size - 2.0 acre

Description .-- SP 5611-0 is an increase of SP 5511-0. In a late planting in 1955 on the Plant Industry Station, SP 5511-0 was higher in leaf spot resistance than US 400 or US 401. Since SP 5511-0, which by increase gave SP 5611-0, was synthesized from selfed progenies of mothers producing superior polycrosses, excellent performance is expected. The full intent of the polycross breeding method was carried out also in a similar manner in the production of SP 5510-0 and SP 5512-0, occurring as Items 5 and 6, respectively. The Breeder Seed SP 5510-0, SP 5511-0, and SP 5512-0 stem from the same basic breeding material that gave US 400 and US 401 but differ somewhat in the emphasis given to the selections. Selfed progenies and clones were pooled according to the performances of the polycross progeny of the mothers, as follows: SP 5510-0, good in general performance at 3 stations SP 5511-0, excellent leaf spot resistance and extremely high sugar with root yield approximately equal to US 400; SP 5512-0, highest in root yield, with sucrose approximately equal to US 400.

(Special seed distribution: 30 grams each to the Great Sugar Company and the American Crystal Sugar Company.)

1tem 5. West Coast/increase of SP 5510-0

*Seed supplied - 30.0 pounds

Plot size - 2.0 acres

Description. -- A synthetic resistant to leaf spot and black root, with high sucrose percentage emphasized in breeding program. For breeding history, see Item 4.

*For seed as planting stock, use West Coast 1955-1956 production at Sprick. A reserve of 20.0 pounds should be retained for field tests in 1957. The remainder of Sprick production is available for use as Item 5.

(Special seed distribution: 30 grams each to Great Western Sugar Company and American Crystal Sugar Company.)

Seed supplied - 30.0 pounds
Plot size - 2.0 acres

Description. -- A synthetic resistant to leaf spot and to black root, with high root yield emphasized in breeding program. For breeding history, see Item 4.

*For seed as planting stock, use West Coast 1955-1956 production at Bernardi. A reserve of 20.0 pounds of seed should be retained for field tests in 1957. The remainder of the production at Bernardi may be used as Item 6.

(Special seed distribution: 30 grams each to Great Western Sugar Company and American Crystal Sugar Company.)

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Item 7. Monogerm SP 557-0
Seed supplied - 1.0 pounds
Plot size - 0.1 acre

Description. -- Breeder Seed SP 557-0 is pooling of outstanding polycross progenies under test at the Plant Industry Station, with emphasis on seedling vigor, rate of emergence, and freedom from off-type monogermness.

(Special seed distribution: 20 grams each to Great Western Sugar Company, Utah-Idaho Sugar Company, and Amalgamated Sugar Company.)

Item 8. Monogerm SP 558-0
Seed supplied - 1.0 pound
Plot size - 0.1 acre

Description. -- Breeder Seed SP 558-0 is a pooling of seed of outstanding single-plant progenies of monogerm segregants recovered from an additional backcross in which plants of US 400 and relatives were used as the recurrent multigerm genotype.

(Special seed distribution: 20 grams each to Great Western Sugar Company, Utah-Idaho Sugar Company, and Amalgamated Sugar Company.)

Item 9. Monogerm SP 566-0

Seed supplied - 1.0 pound
Plot size - 0.1 acre

Description. -- From selected roots of the best monogerm progenies of 1955 under exposure to severe leaf spot and moderate black root on the Plant Industry Station.

(Special seed distribution: 20 grams each to Great Western Sugar Company, Utah-Idaho Sugar Company, and Amalgamated Sugar Company.)

IV. Breeding for leaf spot and curly top resistance:

All overwintering productions under Section IV will be made by the Utah-Idaho Sugar Company. The seed for each production has been sent to Mr. Bion Tolman, except the special distributions which have been indicated for each item.

> Item 10. SP 554-0 Seed supplied - 1.0 pound Plot size - 0.1 acre

Description. -- SP 554-0 was produced from selections made at State College, New Mexico, in US 104 grown under severe curly top exposure.

(Special seed distribution: 50 grams each to Great Western Sugar Company and Holly Sugar Corporation.)

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Item 11. SP 555-0 Seed supplied - 1.0 pound Plot size - 0.1 scre

Description. -- SP 555-0 was produced from selections made at State College, New Mexico, in SP 5350-0 grown under severe curly top exposure. SP 5350-0 and component progenies have shown excellent curly top resistance in tests at Jerome, Idaho. This strain carries some resistance to black root and it is higher in leaf spot resistance than US 104.

(Special seed distribution: 30 grams each to Great Western Sugar Company, American Crystal Sugar Company, Holly Sugar Corporation, and Amalgamated Sugar Company.)

Item 12. SP 5651-0 Seed supplied - 1.0 pound Plot size - 0.1 acre

Description. --SP 5651-0 was produced from root selections made at the Plant Industry Station under severe leaf spot and moderate black root exposure, but selections were taken only from polycrosses that had shown excellent curly top resistance in tests at Jerome, Idaho. This is a very promising production that carries good resistance to leaf spot and black root and excellent resistance to curly top. Although multigerm, SP 5651-0 should be of value as a pollinator and as a source of genetic material. (Special seed distribution: 30 grams each to Great Western Sugar Company, American Crystal Sugar Company, Holly Sugar Corporation, and Amalgamated SugarCompany.)

Special Seed Distribution:

Great Western Sugar Company
Dr. H. E. Brewbaker, Longmont, Colorado

American Crystal Sugar Company
Dr. R. E. Finkner, Rocky Ford, Colorado

Amalgamated Sugar Company
Dr. G. E. Rush, Nyssa, Oregon

Holly Sugar Corporation
Mr. C. E. Cormany, Sheridan, Wyoming

The special distributions were made according to notes taken at the Fort Collins meeting, June 18. These notes may have been incomplete. If seed distribution is expected for an Item not in accordance with this Supplement, notice should be given promptly to the Sugar Crops Section, Plant Industry Station, Beltsville, Maryland.

From LL. AP 555-0

Plot size - O.l sore

phism. -- 3P 155-0 component iron malerations rade at a Coll was lawned. In SP 5740-0 group in make at a top exposures. 'SP 7150-0 and component personies have hear excellent ourly top resistance in terms of Joseph act date. This strain courtes now resistance to black toot and it is bigner in Leaf noot resistance than US 106.

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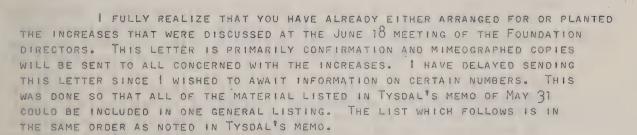
THE BEET SUGAR DEVELOPMENT FOUNDATION

P. O. BOX 538
FORT COLLINS. COLORADO

JULY 23, 1956

SAM C. CAMPBELL, MANAGER
WEST COAST BEET SEED COMPANY
690 FERRY STREET
SALEM. OREGON

DEAR SAM:



FROM SALT LAKE CITY

SLC 15: THE UTAH-IDAHO SUGAR COMPANY, WILL MAKE APPROXIMATELY A 1/10-ACRE INCREASE OF THIS NUMBER AT ST. GEORGE. IN ADDITION TO UTAH-IDAHO, AMERICAN CRYSTAL INDICATED THAT THEY WILL WISH APPROXIMATELY 100 POUNDS OF THE INCREASE AND THE HOLLY SUGAR CORPORATION WOULD LIKE 50 GRAMS NOW.

SLC 18: A 1/10-ACRE INCREASE WILL BE MADE BY THE UTAH-IDAHO SUGAR COMPANY. AMALGAMATED, AMERICAN CRYSTAL, HOLLY, AND UTAH-IDAHO WILL SHARE IN THE DISTRIBUTION OF THE INCREASE. AMALGAMATED AND HOLLY WISH TO HAVE 50 GRAMS EACH NOW.

SLC 19: Approximately a 1/10-acre increase will be made by the Utah-Idaho Sugar Company at St. George. Amalgamated, American Crystal, Holly, and Utah-Idaho will share in the distribution of the increase. Amalgamated and Holly wish to have 50 grams each now.

SLC 20: Approximately a 1/10-acre increase will be made by West Coast Beet Seed Company. American Crystal, Great Western, Holly, Utah-Idaho and F & M will share in the distribution of the increase. Holly wishes to have 50 grams now.

SLC 22: Approximately a 1/10-acre increase will be made by the West Coast Beet Seed Company. American Crystal, Great Western, Holly, Spreckels, and F & M will share in the distribution of the increase. Holly wishes to have 50 grams now.

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JULY 23, 1996

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SLC 24: APPROXIMATELY A 1/10-ACRE INCREASE WILL BE MADE BY THE UTAH-IDAHO SUGAR COMPANY AT ST. GEORGE. AMALGAMATED, AMERICAN CRYSTAL, GREAT WESTERN, HOLLY, SPRECKELS, UTAH-IDAHO, AND F & M WILL SHARE IN THE DISTRIBUTION OF THE INCREASE. AMALGAMATED AND HOLLY WISH TO HAVE 50 GRAMS EACH NOW.

SLC 119: Approximately A 1/10-acre increase will be made by the Utah-Idaho Sugar Company at St. George. Great Western, Holly, Utah-Idaho, and F & M will share in the distribution of the increase. Great Western and Holly would like 50 grams each now.

SLC 121: Approximately A 1/10-Acre increase will be made by the Utah-Idaho Sugar Company at St. George. Amalgamated, Great Western, Holly, and Utah-Idaho will share in the distribution of the increase. Amalgamated, Great Western and Holly would like 50 grams each now.

SLC 122-0: Approximately a 1/10-acre increase will be made by the Utah-Idaho Sugar Company at St. George. Amalgamated, Great Western, Holly, and Utah-Idaho will share in the distribution of the increase. Amalgamated, Great Western, and Holly would like 50 grams each now.

SL 122MS: Approximately a 1/10-acre increase will be made by the Utah-Idaho Sugar Company at St. George. Amalgamated, American Crystal, Great Western, Holly, Spreckels, and Utah-Idaho will share in the distribution of the increase. Amalgamated, Great Western, and Holly would like 50 grams each now.

FROM SALINAS

NB4: Approximately 1/2 acre of this number is to be planted in strips with the three male steriles, C688M, C681M and the MS of NB1 by the West Coast Beet Seed Company. Union and Holly will share in the distribution of the increase. Holly would like 50 grams of the NB4 Now.

C6554M1: THE WEST COAST BEET SEED COMPANY WILL MAKE A 1/2-ACRE PLANTING FOR UNION WITH MS OF NB1 x NB3 AND MS OF NB1 x NB2. HOLLY WISHES 50 GRAMS NOW.

C6554M2: No INCREASE IS DESIRED. HOLLY WOULD LIKE 50 GRAMS NOW.

C688M: NO INCREASE AS NOTED UNDER NB4 ABOVE. ONE POUND IS TO BE USED BY HOLLY AND UNION IN STRIP PLANTINGS WITH NB4. HOLLY WOULD LIKE AN ADDITIONAL 50 GRAMS NOW.

C681M: SAME AS FOR C688M ABOVE EXCEPT THAT SPRECKELS WOULD LIKE SOME SEED NOW AND HOLLY WOULD LIKE 50 GRAMS NOW.

C585 x C585HO: Approximately a 1/10-acre planting will be made by the West Coast Beet Seed Company. Holly, Spreckels, and Union will equally share the increase. Holly and Great Western would each like to have 50 grams of each number now, or if sufficient seed is not available, they will await the increase.

HMATELY A 1/10-ACRE HICRCASE HILLS BE MADE BY THE UTAIN-LOADS AT ST. GEORGE. AMALGAMATELY AMERICAN CRYSTAC. GREAT WESTERN, SELS, UTAM-LOANS, AND F & M WILL SAMRE IN THE DISTRIBUTION OF ... AMALGAMATED AND HOLLY WISH TO DAME 50 CRIMS EACH YOW.

AT ST. GEORGE. SREAT MESTERS, MULL DE MADE DY THE UTAM-LOAND AT ST. GEORGE. SREAT MESTERS, MOLLY, UTAM-LOAND, AND F & M IN THE DYSORIDATION OF THE INCREASE. GREAT MESTERN AND HOLLY . 50 COMMS EACH NOW-

APPROXIMATELY A 1/10-MORE INCREASE WHITE PER MOR BY THE UTAR-IDANG NAV AS ST. GROWER. - AMALGAMATED, GREAT WESTERN, HOLLY, AND UTARS STARE IN THE OFSTRIBUTION OF THE PROXERES. AMALGAMATED, GREAT OF THE PROXIMELY WORLD SIKE TO GREAT HACE WORLD SIKE TO GREAT HALLY WORLD SIKE TO GREAT HACE NOW.

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A AGONE EXCEPT THAT SPREGNELS WOULD LIKE SOME DESCRIPTION.

APPRO INGTERN A 1/10-1008 PLANTING WILL BE MADE BY THE MEST

C586: APPROXIMATELY 1/3 OF AN ACRE INCREASE WILL BE MADE BY THE WEST COAST BEET SEED COMPANY. SOME MS OF NB1 x NB4 WILL BE PLANTED IN A STRIP NEAR THIS SEED. HOLLY AND UNION WILL SHARE EQUALLY THE INCREASE OF C586. GREAT WESTERN, HOLLY, AND SPRECKELS WOULD LIKE 50 GRAMS EACH NOW.

C671: No INCREASE IS PRESENTLY WANTED. GREAT WESTERN, HOLLY, AND SPRECKELS WOULD LIKE 50 GRAMS EACH NOW.

M NB1 x MS of NB1: A ONE-ACRE PLANTING WILL BE MADE BY THE WEST COAST BEET SEED COMPANY. YIELD FROM THIS ACRE WILL BE SHARED EQUALLY BY HOLLY, SPRECKELS, AND UNION.

NB3 x MS of NB1: A FOUR-ACRE PLANTING WILL BE MADE BY THE WEST COAST BEET SEED COMPANY. OF THE INCREASE, HOLLY WOULD LIKE 5%, UNION 65%, AND SPRECKELS 30%. GREAT WESTERN WOULD LIKE 5 POUNDS OF EACH FROM THE INCREASE AND HOLLY WOULD LIKE 50 GRAMS NOW OF THE NB3 AND THE MS OF NB1 x NB3.

MB1 x MS of NB1: A ONE-ACRE PLANTING WILL BE MADE BY THE WEST COAST BEET SEED COMPANY. HOLLY, SPRECKELS, AND UNION WILL EQUALLY SHARE THE YIELD FROM THIS ACRE.

NB2 x MS of NB1: A 1/10-ACRE PLANTING WILL BE MADE BY THE WEST COAST BEET SEED COMPANY FOR SPRECKELS SUGAR COMPANY. FROM THE SEED THAT IS PRESENTLY AVAILABLE, UNION WOULD LIKE 15 POUNDS AND HOLLY WOULD LIKE 50 GRAMS NOW.

FROM BELTSVILLE (Lee Supplement, page 12)

SP 55206-0: APPROXIMATELY A 1/10-ACRE INCREASE WILL BE MADE BY THE WEST COAST BEET SEED COMPANY. THE INCREASE WILL BE SHARED BY HOLLY, SPRECKELS, AND UTAH-IDAHO. GREAT WESTERN AND HOLLY WISH TO HAVE 50 GRAMS NOW AND UTAH-IDAHO WISHES TO HAVE 20 GRAMS NOW. HOLLY WANTS 5 POUNDS OF THE INCREASE.

SP 5517-0: Approximately a 1/10-acre increase will be made by the West Coast Beet Seed Company. The increase will be shared by Holly, Spreckels, and Utah-Idaho. Great Western wants 10 grams now, Holly wants 50 grams now, and Utah-Idaho wants 20 grams now. Holly wants 5 pounds of the increase.

SP 55600-01: Approximately a one- to two-acre increase will be made by the West Coast Beet Seed Company for F & M and Great Western. Holly wishes to have 50 grams now and Utah-Idaho wants 20 grams now. Holly wants 5 pounds of the increase.

SP 5611-0: Approximately a one- to two-acre increase will be made by the West Coast Beet Seed Company for American Crystal, Great Western, and F & M. Holly wants 50 grams now and Utah-Idaho wants 20 grams now. Holly wants 5 pounds of the increase.

WC (6200) INCREASE SP 5510-0: APPROXIMATELY A ONE- TO TWO-ACRE INCREASE WILL BE MADE BY THE WEST COAST BEET SEED COMPANY FOR AMERICAN CRYSTAL, GREAT WESTERN AND F & M. HOLLY WANTS 50 GRAMS NOW AND 5 POUNDS OF THE INCREASE. UTAH-IDAHO WANTS 20 GRAMS NOW.

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FROM BELTSVILLE VILL WAS THE THE PORT

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-01: PPROXIMATELY & ONE- TO TWO-ACRE INCREASE BLIL 3E MADE OF THE A SEET SEET SEET WOLLY WISHES TO YEARS NOW AND ETAM-IDAMO WANTS 20 GRAMS NOW. HELLY WANTS 5 POUNDS IN CONTE.

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WC (6201) INCREASE SP 5512-0: A ONE- TO TWO-ACRE INCREASE WILL BE MADE BY THE WEST COAST BEET SEED COMPANY FOR AMERICAN CRYSTAL, GREAT WESTERN, AND F & M. HOLLY WANTS 5 POUNDS OF THE INCREASE AND 50 GRAMS NOW. UTAH-IDAHO WANTS 20 GRAMS NOW.

SP 557-0: THE WEST COAST BEET SEED COMPANY WILL MAKE APPROXIMATELY A 1/10-ACRE INCREASE PRIMARILY FOR F & M. HOLLY WISHES TO HAVE 5 POUNDS OF THE INCREASE AND 50 GRAMS NOW. AMALGAMATED, AMERICAN CRYSTAL, AND UTAH-IDAHO WANT 20 GRAMS EACH NOW AND GREAT WESTERN WANTS 100 GRAMS NOW.

SP 558-0: THE WEST COAST BEET SEED COMPANY WILL INCREASE THIS NUMBER THE SAME AS FOR SP 557-0. IMMEDIATE SEED REQUESTS ARE ALSO THE SAME.

SP 5660: THE WEST COAST BEET SEED COMPANY WILL INCREASE THIS NUMBER THE SAME AS FOR SP 557-0 AND SP 558-0. IMMEDIATE SEED REQUESTS ARE ALSO THE SAME.

SP 554-0: THE UTAH-IDAHO SUGAR COMPANY WILL MAKE APPROXIMATELY A 1/10-ACRE INCREASE OF THIS NUMBER AT ST. GEORGE. AMERICAN CRYSTAL WILL WANT 2 POUNDS OF THE INCREASE, GREAT WESTERN, HOLLY, AND SPRECKELS WILL EACH WANT 5 POUNDS OF THE INCREASE. HOLLY WANTS 50 GRAMS NOW.

SP 555-0: THE UTAH-IDAHO SUGAR COMPANY WILL INCREASE THIS NUMBER AT ST. GEORGE FOR THE SAME REQUESTS AS 554-0. IN ADDITION, AMALGAMATED WANTS 10 GRAMS NOW.

SP 5651-0: This will be increased by the Utah-Idaho Sugar Company at St. George for the same requests as for SP 555-0.

IF THERE ARE CHANGES TO BE MADE THAT AFFECT PLANTING, THE COMPANIES CONCERNED WILL PROBABLY CONTACT YOU DIRECTLY. Those that are planted differ from the estimates listed in this letter. This was done to have the Foundation second correspond with our June 18 meeting notes.

VERY TRULY YOURS,

SECRETARY

JAMES H. FISCHER WMF

THE WEST SOAS SEET SEED SOMPAN WILL HAKE APPROXIMATELY & 1/16-ACRE THARPIET FOR F 6 M. MOLLY WISRES TO DAVE 5 PORMOS OF 182 MORROSE FOR MOUNT HALLOANSTEE, ARESTON GRYSHAL, AND UNIAM SALE WASTE 100 BRING MON. AND UNIAM SALE WASTE TO BRING MON.

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DE THE MEDE COACT SEET CHEE CLASSING WILL INCREASE THES NOWER THE SAME TO SELECT AND SP 530-00. IMPROVATE SEED RECOESTS ORE ALSO THE SAME.

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THE STRENDARD SUCLE COMPANY MILE PROJECT THIS RUMBER AT ST. COURSE REQUESTED AS SSEC. IN FOCITION, AMERICANTED MARTS TO SEASE EDW.

THIS WILL BE INCREASED BY THE UTAHTIBANC SOMAR COMPANY AT ST. SECOND DECISIONS AS FOR SP SPEC.

IF THERE ARE CHARRED TO BE MADE THAT AFFROT PLONTERS, THE COMPANIES WILL PROBABLY CONTACT YOU DIRECTLY. TROSE THAT ARE AVAITED GIFFER PROBABLY OF THIS LOTTERS THE FOUNDATION'S ONE OF MADE I NEETING BOTES.

VERY TRILLY VALUE.

SECRETARY

PART II

DEVELOPMENT AND EVALUATION OF INBRED LINES AND HYBRID VARIETIES OF SUGAR BEETS

with emphasis on

Curly Top Resistance Monogermness and High Quality

A. M. Murphy C. H. Smith Charles Price Myron Stout Charles Price

F. V. Owen G. K. Ryser

and Cooperators -DIVELORMAN AND SVACHATION OF INSEED LIVES
AND INTELL VARIEFYED OF SUCAR BESTS

with emphasis on

Carly Top Resistance

Monagermess and High Dualitly

G. M. Ayser C. M. Saith

A. Marring Charles Price

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PROJECT 23, REPORT OF 1956 RESULTS INTRODUCTION

By F. V. Owen

The first commercial curly-top-resistant monogerm hybrids are based largely on two good monogerm lines, SLC 91 and 108, developed by Dr. V. F. Savitsky. These lines carry only an intermediate degree of curly-top resistance but when their MS equivalents are crossed to multigerm pollinators high in curly-top resistance, the F1 hybrids appear satisfactory. The greatest handicap with the intermediate degree of curly-top resistance has been in the seed fields at St. George, Utah, where the disease was severe in 1956. Here the newer monogerm line SLC 117 and its hybrids showed much higher degree of curly-top resistance and produced much better seed yields.

Several additional monogerm lines developed by Dr. Savitsky have since been released with somewhat better curly-top resistance than SLC 91 or 108. In 1956 SLC 122 (a composite of seven sublines) was released for still higher curly-top resistance. Some of these new lines tested at Jerome, Idaho in 1956 showed degree of curly-top resistance equal to the best available in multigerm lines. Forty new monogerm lines, segregating for Mendelian male sterility, were selected for studies of combining ability, in cooperation with the Amalgamated and Utah-Idaho Sugar Companies.

Work has continued on high sugar curly-top-resistant multigerm lines with emphasis on points of interest in connection with sodium, potassium, amino nitrogen and respiration determinations made by Myron Stout. Cooperative work with Dr. Albert Ulrich of the University of California has been continued on petiole analyses.

Individual beet data for 1955 and 1956 are being transferred to IBM cards and statistical determinations for the two years work will be made with new equipment being installed at Beltsville, Maryland.

Two of the high sugar multigerm lines, CT5 (157) and CT8 (158) have been released for sugar company use. Monogerm hybrids to these lines have already been made with F2 and backcross populations now underway. The following pages show some of the evaluation results obtained in 1956.

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Utah and Idaho Tests

Frozen pulp samples from Twin Falls, Idaho, were taken to Salt
Lake City, Utah, where all sucrose and purity determinations were made
under the direction of C. H. Smith. Sodium, potassium and nitrogen
readings were made by Myron Stout. Sodium and potassium were determined
with a flame spectrophotometer. Amino nitrogen was determined by the
Stanek-Pavlas method using the spectrophotometer as an absorption
instrument. The "amino N" values reported are based on the concentration of glutamine necessary to produce the same color. True "amino N"
would be 0.097 times the values given. Mr. G. K. Ryser is responsible
for the statistical analyses.

MS = Cytoplasmic male sterility

aa = Mendelian male sterility

mm = Monogerm

MM = multigerm

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VARIETY TEST, TAYLORSVILLE, UTAH, 1956 FIELD TESTS I, II, and III

(Pages 24-25-26)

By C. H. Smith

Grower: Rell Swenson

Soil type: Welby fine sandy loam

Previous crops: 1950, sugar beets; 1951, grain; 1952-1954, alfalfa; 1955, grain.

Fertilizers and cultural practices: In the fall of 1955 the field was fertilized with 15 spreader loads of manure (chicken litter) and fall plowed. In the spring a top dressing of chicken litter, 100 pounds of ammonium sulphate and 100 pounds of treble superphosphate per acre was applied and worked into the top soil during seed bed preparation.

Irrigations: First irrigation, June 20. Total of 11 irrigations by furrow.

Planted: April 9 Thinned, May 10 and 11 Finger weeded, May 4

Row spacing, 20 inches. Harvested: October 11

> Objective at thinning was 10 to 12 inches but some variations occurred. Three-foot alleys between ends of plots were cut just prior to harvest. At harvest the tops were removed with a rotobeater and beets scalped with tractor-mounted scalping tools supplemented by long-handled hoe work. Beets were counted before pulling.

Nematode injury: The field was fumigated with "Shell DD" prior to planting. Soil moisture being a critical value in the use of a soil fumigant, no doubt was the reason for failure of the "Shell DD"to prevent nematode injury. In June nematode injury began to show in weaker inbred lines and as the season progressed the more vigorous hybrid varieties showed some depression in growth. Among inbred lines nematode effects varied from severe to mild, depending upon the vigor of the variety.

Experimental design: The beets were planted in 2-row plots 47 feet long. These were cut to 44 feet at harvest. Two ten-beet samples were taken from each plot at random for sugar analyses. Samples for sucrose determinations were weighed after washing in the laboratory to ascertain tare values for each variety.

The variety tests considered here are three groups of ten varieties and four replications of randomized block designs. A fourth test consisted of strip plantings of a commercial multigerm variety compared with a good monogerm hybrid (F54-4H21). Strip plantings were made with a six-row McCormick Deering disc type planter with plate holes drilled to 12/64 and seeding rate at five pounds per acre. Acre yields and laboratory analyses were as follows:

	TONS SUGAR		SUCROSE PERCENT	PURITY PERCENT	State of the last	er 10 K	0,000 N	BEETS 100'	AV. BEI	ET WT.LBS. SAMPLE
Monogerm Multigerm			15.0	85.5 84.9				69 71	38 32	31 28
Difference	+.515	+2.7	+0.4	+0.6	+8	-19	-70	-2	+6	+3

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VARIETY TEST--TAYLORSVILLE, UTAH, 1956

(4 replicated plots of each variety)

TEST I

VARIETY CODE	ACRE YIE SUGAR Ton	BEETS	SUCROSE Per	PURITY	Andrew or the same of	K per 10	AMINO N	BEETS 100'	AV. B. PLOT	EET WT. SAMPLE
mm Hyb. 10 SLC 15 mm 9	3.891 3.932	24.2	16.1	88.6 87.0	60 79	271 297	180 230	79 88	2.5	2.7
mm Hyb. 8 Mm Hyb. 7	3.989 4.154	25.6 28.2	15.6 14.8	87.5 86.7	82 85	266 309	200	91 78	2.3	2.3
MM Hyb. 6 mm Hyb. 5	4.305 4.328	30.2 27.5	14.3 15.8	86.7 86.8	89 85	281	270 230	95 84	2.6	2.8
Mm Hyb. 4 Mm Hyb. 3	4.329	28.8	15.0 15.1	86.9 86.8	78 84	293 294	260 250	· 77 86	3.1	2.6
US 41 2 MM Hyb. 1	4.529	29.2	15.5	86.8 86.4	77	303 309	290 340	81 80	2.6	2.6
General MEAN of all varieties	4.248	28.0	15.2	87.0	80	294	249		and the second s	
S. E. of MEAN Sig. Diff (19:1) S. E. of MEAN in % of MEAN	0.20 0.58 4.71	1.17 3.39 4.18	0.32	0.56	6 16 7.4:	11 31 1 3.7 ¹	30 86 + 12.0			

VARIETY	VARIETY AND PARENTAGE	CURRENT	FIELD
CODE		NUMBER	CODE
mm Hyb. 10	421+1 aa mm X Group	53+2	3018
SLC 15 mm 9	Self-sterile monogerm SLC 151/	SLC 15	0015
Mm Hyb. 8	428H10 MS mm X SLC 117 1 23H15 MS mm X (US 35 aa X Klein E	536H2O) F54-4H21	3013 1003
MM Hyb. 6	US 22 MS (401H6) X (US 35 aa X CT9)	509H6	2005
	421+1 aa mm X Curly-top susc.	54.3+2	3027
Mm Hyb. 4	(610 X 91) MS = X (US 35 = X CT9)		3002
Mm Hyb. 3	428H100 MS mm X (US 35 = X CT9)		3003
US 41 2	US 41	028	0028
MM Hyb. 1	CT9 MS Hyb. X (US 35 aa X Klein E)	F54-4H7	1002

Designations:

mm Hyb. = Both parents monogerm

Mm Hyb. = Q monogerm, o' multigerm

MM Hyb. = Both parents multigerm

[□] SIC 15 is a self-sterile population developed by V. F. Savitsky

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			165			PSE. 4

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91) 0 am x (US 30 on 0 0TS) SOURCE M3 m X (US 35 to X 609) 509161
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VARIETY TEST--TAYLORSVILLE, UTAH, 1956

(4 replicated plots of each variety)

TEST II

VARIETY		ACRE YI SUGAR TONS	-	SUCROSE	PURITY	Na P. pe	K	AMINO 0,000	BEETS 100'	AV.BEI PLOT Pour	SAMPLE
MM Hyb. 10		3.402 3.673	22.3	15.3 15.6	86.0 86.2	67 53	292 279	330 350	76 90	211	5.5
" 8 " 7		3.734 3.760	25.7 22.7	14.6 16.6	86.2 87.3	87 55	305 2 54	310 340	91 92	2.3	2.2
" 6 Mm Hyb. 5		3.963 4.065	24.3 28.2	16.3	88.5	58 80	29 ⁴ 277	310	100	2.0	1.9
MM Hyb. 4		4.175 4.236	26.5 28.7	15.8 14.9	86.8 87.8	47 73	287 297	350 240	94 101	2.3	2.3
Mm Hyb. 2		4.360 4.436	30.2 30.3	14.3	86.1 86.6	97 82	315 330	210	92	2.7	2.6
General MEAN of	•	3.980	26.2	15.2	86.7	70	293	301.			
all varieties S. E. of MEAN		0.19	1.21	0.42	0.78	6	10	31			
Sig. Diff. (19:	1)	0.55	3.51	1.22	2135	18	28	90			
S. E. of MEAN in % of MEAN	1	4.77	4.61	2.76	9.00	8.59	3.4:	1 10.3			

VARIETY CODE		PARENTAGE			CURRENT NUMBER	FIELD CODE
MM Hyb.	10	US 22 MS (211H3) do.	×	SL 50 (Group of lines MM Line 5030	50H3 5030H3	2063
11	8	do.	×	SL 202 sel. MM Line 289	502H3 5080H3	2066 2030
Mm Hyb.	6 5	do.	X		5060H3 534H3	2016 2078
MM Hyb.	4 3	do.	X	MM Line 287 (CT7 MM Line CT9 (new		2023 2034
Mm Hyb.	2	do.	X	mm Line 532 mm Line 5110	532H3 5110H3	2007 2036

Designations:

MM = Both parents multigerm
Mm = d monogerm, & multigerm

						¢.38 1.73	\$04.4	
				2.88 2.78		T. 22 T. 35	3-756	
	0.2				16.31	₹.48		
E.9 Y-8						2.39		
2.6	7.5		325 350					
				7:33				
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VARIETY TEST--TAYLORSVILLE, UTAH, 1956

(4 replicated plots of each variety)

TEST III

VARIETY	ACRE	YIELD		and the second s			AMINO	BEETS	AV. B	EET WT.
CODE	SUGAR	BEETS	SUCROSE	PURITY	Na	K	N	1001	PLOT	SAMPLE
	Tor	15	Per	Percent		P. per 100,000			Pounds	
10 9	3.489 3.630	22.3	15.7 15.6	87.6 85.4	50 68	286 328	310 320	92 81	2.0	2.0
8 7	3.691 3.836	22.1	16.7 16.4	87.1 88.2	43 38	258 265	420 280	82 86	2.3	2.4
6 5	4.010	25.5	15.7 16.8	86.8 88.2	64 33	271 264	350 330	93 91	2.2	2.4
4 3	4.191	26.0 25.5	16.1 16.6	86.9	56 44	306 281	320 340	84 93	2.6	2.5
2 11	4.292	27.9 29.7	15.4 15.2	87.0 87.2	66 59	308 299	250 310	96 88	2.6	2.5
General MEAN of all varieties	3.998	25.0	16.0	87.2	52	287	322			
S. E. of MEAN	0.27	1.60	0.33	0.58	04	10	32			
Sig. Diff.(19:1)	N3	4.64	0.96	1,68 NS	12	29	92			
S. E. of MEAN in % of MEAN	6.75	6.40	2.06	6.65	7.6	9 3.	48 9.9	4		

VARIETY	PARENTAGE	CURRENT	FIELD
CODE		NUMBER	CODE
10	US 35 aa X MM Line 5030	5030+5	2008
9	US 35 Hybrid aa X US 201 (High in LSR)	506+7	
8	US 35 aa X MM Line 289	5080+5	2024
7	MM Line 287 aa X SL 202 sel.	502+287	2002
6	MM Line 157 aa X do.	502+157	2001
5	US 35 aa X MM Line 287	5070+5	2017
4 3	do. X SL 50 (Group of MM Lines) US 35 aa X MM Line 5060	50+5 5060+5	2037 2012
2	US 35 Hyb. aa X US 201 (High LSR) US 35 aa X CT9 (new)	506+6 4090+5	2003 1004

Remarks: All hybrids are multigerm.

US 201 was developed at Beltsville, Md. It is curly-top

susceptible, but very high in Cercospora leaf-spot-resistance.

9.8			8.83 9.88		
3.5				1.0.1	0.08
				15.8	
				2.05	

\$10804 \$108087								
502×157 5070+5								
		SL 50 NM Like						

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TWIN FALLS, IDAHO, VERSUS TAYLORSVILLE, UTAH, 1956
Hybrid Combinations

PARE	NTAGE		ACRE	YIELD					AMINO	BEETS	PER
O.T.	Ŷ		SUGAR	BEETS	SUCROSE	PURITY	Na	K	N	100	
			To	ns	Per	cent	P.	per l	.00,000		
Twin Falls, Idaho											
5030	US 22	MS	5.846	32.4	18.1	89.8	16	204	420	99	
do.	US 35		5.723			88.8	15	215		95	
Taylorsville, Utah											
do.	US 22	MS	3.673	23.4	15.6	86.2	53	279	350	90	
do.	US 35	aa			15.7		50	286		92	
				Twin Fa	alls, Idah	0					
5060	US 22	MS	5.600		18.3		17	222	400	90	
do.	US 35		6.032			89.7	15	218		95	
				Taylors	sville, Ut	ah					
do.	US 22	MS	3.963	7	16.3		58	294	. 310	100	
do.	US 35		4.237		16.6		44	281		93	
					alls, Idah				1.0		
287	US 22		5.960		18.3		14			99	
do.	US 35	68	5.686		18.2 sville, Ut		12	Toc	400	95	
	US 22	MC	4.175	**	15.8		47	287	350	94	
do.	US 35		4.130	24.6	16.8	88.2	33			91	
				Twin Fa	alls, Idah	0					
289	US 22		5.432	-	18.7		15	184		98	
do.	US 35	88	5.295	27.7		89.9	11	180	520	88	
					sville, Ut			1			
do.	US 22		3.760		16.6		55	254 258		92 82	
do.	US 35	88	3.691	22.1	16.7	0(+1	47	250	420	02	
				Twin Fa	alls, Idah	.0					
CT9	US 22	MS	6.306		18.0		25	215			
do.	US 35	88	6.160	34.9	17.7	90.9	20	207	370	96	
				_	sville, Ut						
do.	US 22		4.236			87.8	73	297		101	
do.	US 35	aa	4.471	29.7	15.2	87.2	59	299	310	88	
Twin Falls, Idaho											
SL 50	US 22	MS	6.053	33.8		89.6	20	205		88	
do.	US 35		5.999	33.0	18.2	90.4	14	202	420	90	
				Taylors	sville, Ut	ah					
do.	US 22	MS	3.402	22.3		86.0	67	292		76	
do.	US 35		4.191	26.0		86.9	56	306	320	84	

^{1/}All pollinators were self-fertile inbred lines. SL 50 represents m group of such lines.

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Service (Service Service Servi						
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					Payron	
			5.85			
	059		9.08		1.99	
			8.69			
				3.6.6		
	I ous			24.5		
						15

- 28 EFFECT OF GENOTYPE AND LOCATION,
TWIN FALLS, IDAHO, AND TAYLORSVILLE, UTAH, 1956

		YIELD BEETS	SUCROSE	PURITY	Na	K	AMINO N	BEETS 100'
	The state of the s	ons	Pero	The same of the sa			00,000	
POLIZINATOR: 1	(Female	parents	combined,	16 replica	tions)		
5030	4.683	27.4	16.87	88.1	34	246	382	94
5060	4.958	28.3	17.40	88.8	34	254	370	94
287	4.988	28.8	17.27	88.4	27	235	410	95
289	4.544	25.4	17.80	88.5	31	219	432	90
СТ9	5.293	32.1	16.45	89.3	1414	254	328	93
SL 50	4.911	28.8	16.88	88.2	39	251	365	84
LSD 5%	0.37	2.20	0.45	NS	7	16	55	
	(Poll:	inators	combined,	96 replicat	ions)			
FEMALE:								
US 22 MS	4.867	28.5	16.98	88.5	38	244	370	93
US 35 aa	4.925	28.5	17.24	88.6	31	242	392	91
LSD 5%	NS	NS	,0.18	NS	3	NS	NS	
US 22 MS (% basis)	99	100	<u>98</u>	100	123	101	94	102
US 35 aa (% basis)	100	100	100	100	100	100	100	100
(Gen	otypes	combined	, 96 plots	at each lo	cation	1)		
LOCATION:								
Twin Falls, Idaho	5.841	32.1	18.26	89.8	16	203	433	93
Taylorsville, Utah	3.952	24.8	15.97	87.3	53	283	329	90
Twin Falls (% basis) 148	129	114	103	30	72	132	103
Taylorsville (") 100	100	100	100	100	100	100	100

All pollinators were self-fertile inbred lines. SL 50 represents a group of such lines.

ANTONIO DESCRIPTION DOORTON,
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			, bentsino:				
					ste.		
			04-5				
		0.89		4.88			
					3.8	1132	
	E68.5	L. 96					56
	78.0		28.0				
							53
				CA			
					251		
(about #)							

	25			

COMPONENTS OF VARIATION (F VALUES) BASED ON RESIDUAL ERROR

Source of Variation	Degrees of Freedom	ACRE Y Gross Sugar	YIELD Tons Beets	Sucrose	Purity	ANALYSES	×	Amino	Sig. 5% Point	F Values	
Locations	rd	307.2	130.26	307.41	91.78	360.83	285.52	43.74	3.98	7.01	
Replications	M	5.52	7.57	19.0	2.45	5.01	4.01	4.79	2.74	4.08	
Pollen Parents	70	3.89	7.89	70.6	. C.	6.92	5.68	K .	2.35	3.29	
Female Parents	М	0.003	0.00	4.05	07.0	14.24	0.30	1.96	3.98	7.01	
Location X Pollinator	72	1.02	1.01	1.07	2.76	1.75	0.81	45.0	2.35	3.29	
Location X & Parent	Н	1.02	0.45	7.1	0	45.4	0	0.02	3.98	1.01	- 2
Pollen X & Parent	r.	0.00	0.80	0.51	0.50	0.32	0.82	0.54	2.35	3.29	9 -
Loc. X Pollinator X 9	ľV	0.05	0.41	45.0	1.37	0.19	0.20	0.52	2.35	3.59	
Error	69										
Total	95										

			5	8 .		
		35 C)				
8						92. 788 788
					53	
1						
			(30.15			
- F. 100						

- 30 TWO HYBRIDS COMPARED WITH US 41, 1956

	нув	RIDS	US 41
	(CT5 X CT9)	(CT8 X 289)	SL 028
	Twin Fal	ls, Idaho	
Gross sugar Tons per acre	6.58	5.09 <u>87</u>	5.82 100
Tons beets	36.6 <u>112</u>	26.3 <u>80</u>	32.8 <u>100</u>
Sucrose percent	18.0 <u>101</u>	19.4	17.8 100
	Taylorsv	ille, Utah	
Gross sugar Tons per acre	5*11 <u>123</u>	3.43 <u>82</u>	4.16 <u>100</u>
Tons beets	34.0	18.6 <u>68</u>	27.5 100
Sucrose percent	15.1 100	18.5 <u>123</u>	15.1 100
Sucrose percent	Granger 16.0 <u>106</u>	18.4 122	15.1

Remarks:

There were two replicated plots of each hybrid at Twin Falls, Idaho and Taylorsville, Utah, and one observation plot at Granger, Utah.

^{1/} Percentage basis

THE RECEDED STONESSES FROM ON LL 1991

		Win Pages, 24	
87.5 200			
	13.7		

ware two replicated place of each byorid at Twin Tails, and Two types of the Third Tails, and one observation plat at

Percentage basts

- 31 DESCRIPTION OF SELECTED INBRED LINES

LINE	COMBINING ABILITY	SUCROSE PERCENTAGE	Na	К	AMINO N	RESTIRA -
CT9 (new)	Good	+	++	++	-	+
CT5 (157)	Variable	++	4	+	+	+
CT8 (158)	Poor?	+-1-+	+	+	+	+
287	Fair	++	-	19th	+++	++
289	Poor	4+4	-	-	+++	+++

Designations:

- Low to very low
- + Intermediate
- ++ Moderately high
- +++ Very high

LOW SO YELV LOW

BRAWLEY, CALIFORNIA

Planted: September, 1955 Harvested: May 3, 1956 By Charles Price and Don Fife

	ACRE	YIELD			
Variety	Gross sugar	Beets	Sucrose	Purity	Beets 100'
8 replicated plots each variety	Pounds	Tons	Perce	The state of the s	Number
SLC 15 mm (Self-sterile)	6,884	22.7	15.2	88.3	112
34.91H3 (MS X SLC 91 mm)	8,608	29.5	14.6	85.8	117
5110H3 (MS X 5110 mm)	8,624	30.0	14.4	87.0	120
534H3 (MS X SLC 117 mm)	8,184	28.8	14.2	86.8	111
LSD, 5% point	510	2.0	0.6	3.6	
4 replicated plots each variety					
5070H3 (MS X Line 287)	7,520	25.1	15.1	83.4	118
5070+5 (US 35 aa X Line 287)	8,034	26.4	15.3	88.5	118
5080H3 (MS X Line 289)	7,170	24.9	14.4	78.4	116
5080+5 (US 35 aa X do.	7,236	23.4	15.4	84.9	119
5901 F ₂ (4 <u>n</u> × 4 <u>n</u>) ¹ /	8,618	33'.6	12.8	91.8	109
54.3+2 mm aa mm X mm	6,894	24.6	14.1	87.3	107
SL 539 mm (Self-sterile)	7,334	26.2	14.1	85.7	113
SLC 18 mm (Self-sterile)	6,428	22.7	14.0	87.1	116
LSD, 5% point	NS	NS	NS	6.3	
Two observation plots of each lin	<u>e</u>				
MM line 287 MM Line 289 SLC 108 mm SLC 91 mm SLC 111 mm SLC 115 mm SLC 116 mm SLC 117 mm	5,518 1,042 6,522 5,858 6,992 6,332 7,566 5,198	19.5 3.9 22.7 19.7 22.8 22.2 27.4 18.9	14.1 13.4 14.4 14.9 15.3 14.3 13.7	87.0 68.6 89.6 86.3 87.8 86.0 85.2 86.5	121 104 107 110 111 101 118 111

Number 5901, developed by Dr. Helen Savitsky, represents an F_2 population from a hybrid between (US 35, 4n X US 22/4, 4n).

In Charles Print and

		Average de san
		(all rave 0
		(mm 10 100
	0.08	
	7.98	
	1.78	

ad by in the South . represents so ry popularion at (02.55, 10.00 to 10.00).

TEXAS U.S.D.A. COOPERATIVE VARIETY TEST 1956

Location: Mr. G. C. Paetzold Farm - 1-1/2 mile south of Hereford, Texas

Cooperators: Mr. Odean Nixon; American Crystal Sugar Company

Date of Planting: April 17, 1956 Date of Harvest: October 29, 1956

Field History: 1952 Potatoes

1953 Beets

1954 Potatoes, Lettuce

1955 Milo 1956 Beets

This was an 8 X 8 Latin Square test with eight varieties and eight replications. The plots were 4 rows (30" rows) wide and 35 feet long. The two center rows were harvested, making a total of 70 feet harvested. Two 10-beet samples were taken at random for sucrose determinations.

Prior to planting, 100 pounds of Sulfated-Potash, 200 pounds of Ammonia-Sulfate, and 200 pounds of 20% phosphate were plowed down. During the growing season 150 pounds of Anhydrous Ammonia was added by sidedressing.

Disease: Curly-top and yellow vein virus were both present with approximately 10 percent of the beet population affected.

Reliability: Reliability of this test can be considered as good.

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ion: Mr. C. C. Rentraid From 1-1, E wile nouth of Herons, Terms t Mr. Class House American Drystel Sagar Corpeny of Flooting: April 17, 1962 descent: October 26, 1965

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TEXAS U.S.D.A. COOPERATIVE VARIETY TEST - 1956

By American Crystal Sugar Co.

DESCRIPTION	VARIETY	ACRE YI GROSS SUGAR Pounds	ROOTS Tons	SUCROSE Percent	PIANTS PER 100' ROW Number
Similar to US 104 426H100 MS mm X (824 aa 1 new CT9)	SP 55105-0 509H21	10,780	34.98 33.66	15.41	132.9 138.6
(MS X CT9) X (824 aa X Klein E) 55112-0 (Similar to US 104)	F54-4H7 Acc. 1366	10,220	32.72 32.48	15.62 15.35	127.1 131.4
401H6 X (824 aa X new CT9) Commercial	509H6 US 35/2	9,742		15.55 15.56	118.6
U.S D.A. Commercial 428HlO MS mm X SLC 117 mm	us 104 536H20	9,600	30.87 29.51	15.55 15.72	110.0
General Mean S. E. Variety Mean " " as % of Gen. Mean Diff. Req. for Sig. (Odds 19:1)		9,996 401.2 11.3% 1144.73	32.06 1.21 10.7% NS	15.5 0.21 3.8% NS	127.9 6.49 14.3% NS

Source of Variance	D/F	MEANS Gross Sugar a/ (1bs.)	Roots	The same of the sa	Plants per 100' row
Columns	7		2066.47	2.687	267.71
Blocks	7	-	1939.56	• 755	850.57
Varieties	7	-	1577.96		332.57
Error	42	-	762.85	.342	165.23
Total	63				
Calculated F.	Value		NS	NS	NS

a/ Calculated from the formula: SE lbs. Sugar = Mean lbs. sugar

(SE lbs. Beets) 2 + (SE % Sugar) 2 (Mean lbs. beets) (Mean % Sugar)

D. D.A. CCOPERATORY WILLIAM MINER . LORG.

AV AMERICAN COVERS INVEST CE.

10.81 79.81		10,780	(913 wen X ne 498) X 5
			A (S) (M) (S) X (S
	32,33		X see CT9)

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		78.599.50 74.5990S	

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PROJECT 22, REPORT OF 1956 RESULTS

By Albert M. Murphy

Jerome 1956 Beet Testing Field

Since the curly top disease is sporadic under natural conditions, it has greatly expedited the program of breeding for resistance to be able to induce an epidemic of the disease every year. The curly top exposure of 1956 was satisfactory, since it was severe enough to test adequately even the most resistant material. The success of these epidemics has placed a premium on space in the Jerome Testing Field to a point where the present demand for space exceeds that available.

Probably the most important accomplishment of the work at the Jerome Testing Field in recent years has been the incorporation of curly top resistance into monogerm varieties. The effectiveness with which this has been achieved is indicated by the fact that new monogerm lines tested in 1956 showed curly top resistance equal to some of the best multigerm lines.

The Testing Field at Jeome, where severe epidemics are induced yearly, has become increasingly important in measuring the degree of curly top resistance inherited in inbreds and in hybrid combinations. One practical use of the information gained has been the evaluation of commercial monogerm hybrids.

One group of inbreds supplied by the Breeders' Forum is of general interest to all breeders. In 1956 there were 56 numbers included in the Forum test. One inbred, FC 55-8035, Key Number 36 (one of Deming's inbreds, if the record is correct) was found to be highly resistant to curly top. Previously all Deming numbers have proved to be highly susceptible. It seems desirable to re-test this inbred to see whether or not an error occurred somewhere along the line in handling the seed.

The technique for screening varieties for curly top resistance at the Jerome Testing Field and the opportunity it affords for making selections under severe exposure to the disease have interested several of the sugar company breeders who supplied seed samples for evaluation.

In 1956, selections were made from 157 inbreds and varieties developed by the Sugar Crops Section and 29 varieties developed by sugar companies.

The following pages give results of a special curly top virus test in one part of the field. Some of the curly top grades for selected varieties are included in the report for Project 23.

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- 36 VARIETY TEST UNDER CURLY-TOP EXPOSURE
JEROME, IDAHO, 1956

By Albert M. Murphy

C. T. Sept.	Grade 6	VARIETY	PARENTAG	E		FIELD
			TEST I			
	4	F54-4H7	CTO MS hybrid	X	(US 35 as X Klein E)	1002
	4	F54-4H21		X	do.	1003
		509н6		X	(US 35 am X CT9)	2005
	5	509H15		X	do.	3002
	3 5 5	509H21		X	do.	3003
		,0,23000				
	3	536H20	MS mm	X	SLC 117 mm	3013
	5	SLC 15	Self-sterile m	m	(By Dr. V. F. Savitsky)	0015
	6	US 33	Check			L 333
	14:	SL 028	US 41			0028
	3 5 6 4 5 5	53+2	421+1 aa mm	X	mm Group	3018
	5	54.3+2	do.	X	mm CT Susceptible)	3027
			TEST II			
			TEOT II			
	3	50H3	MS (211H3)	X	SL 50	2063
	2	502H3		X	SL 202 sel.	2066
	3	532H3		X		2007
	3	5030H3		X		2011
	3 2 3 3 2	5060H3		X	287	2023
	2	5070Н3		X	The state of the s	2023
	3	5080Н3		X		2034
	4	5110H3	ás.	X	5110 mm	2036
			TEST III			
	3	4090+5		X		1004
	3	50+5	***	X	-	2037
	3	5030+5		X		2008
	3 2 2	5060+5		X	5060	2012
	2	5070+5	do.	X	287	2017
	3	5080+5	do.	X	289	2024
	3 3 4 5 6	502+157		X	SL 202 sel.	2001
	4	502+287	287 aa	X ·		2002
	5	506+6	HS 35 hybrid a	a	X US 201	2003
	6	506+7	do.	X	do.	2004

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(18) se X 10 app (18) (18) (18) (18) (18) (18)			
			50 850 3.5
en of Susceptible)		.00	

6508 4508 3608		

1050+5 504-5 5060-5 5070+5 5080+5 508+187 506+6

VARIETY TEST, TWIN FALLS, IDAHO, 1956 FIELD TESTS I, II and III (Pages 38-39-40)

By Albert M. Murphy

Owner: J. S Feldhusen and Son

Soil type: Portneuf silt loam, deep phase, good drainage

Totation: 1946, alfalfa; 1947, alfalfa; 1948, potatoes; 1949, beets; 1950, beans; 1951, beets; 1952, grain (mx); 1953, alfalfa; 1954, alfalfa;

1955, potatoes.

Preparation for crops: In previous years barnyard manure or first cutting of alfalfa plowed under for some of the crops.

For 1956 sugar beet crop:

1. Applied 8 loads of barnyard manure per acre early in the spring

2. On March 16, broadcast 200 treble superphosphate per acre (43%)

3. Plowed March 17-29

4. Harrowed

5. Leveled

6. Harrowed

7. Leveled

8. Broadcast 300# Ammonium Sulphate (20.6%) per acre, April 10

9. Harrowed

10. Planted April 11-12

11. Harvested October 22-24

Irrigations: June 16, first time Method: Furrow

Sept. 29, last time

Total irrigations: Nine

Thinned: May 23

Sprayed for webworms: In August

Stand corrections: Stands were corrected to "space occupied" using Deming's method. Gaps less than 24 inches not considered. Most stands in tests I to III reported here were excellent so corrections were minor.

Record of strip plantings harvested October 22:

	600 feet	long Klein E (SL 4324) " Hybrid F54-4H7	Tons per acre 31.59 31.54	CT % 56 Trace
4 "	88 A1	" Monogerm F54-4H22 " Commercial seed	30.46 28.47	3

Curly-top exposure: Moderate, 56 percent obvious infection in Klein E variety on October 16. With the exception of Klein E (SL 4324) no yellowing due to curly top appeared.

Experimental design: Four-row plots 52 feet long in 22"rows. Plots cut to 50 feet at harvest. Two inside rows harvested for yield and sugar data with two ten-beet samples for analyses. The three tests considered here were in randomized block designs. A fourth test was made up of 35 hybrids with two replications. There were 37 hybrids and 40 inbreds in single observation plots

- 57 -

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- 38 - VARIETY TEST, TWIN FALLS, IDAHO, 1956

(4 replicated plots of each variety)

TEST I

VARIETY	-	E YIELD				A	MINO	BEETS	AV. BEE	T WT.
CODE		BEETS	The state of the s	PURITY	Na	K	N	100'	Plot	Sample
	Ton	5	Perc	ent	P.	per 10	0,000		Pounds	
mm Hyb. Calo SLC 15 mm 9	5.383 5.643	30.7 31.9	17.6	89.4	36 38	232 230	330 360	87 102	3.2	3.1 2.7
mm Hyb. 8 US 41 7	5.685 5.822	31.9 32.8	17.9	90.4	25 26	189 220	320 420	95 98	3.1 3.0	2.8 2.6
MM Hyb. 6 mm Hyb. 5	5.874 5.895	33.2 32.8	17.7 18.0	89.6 89.6	29	215 194	420 330	89 99	3.4 3.0	3.0 2.2
Mm Hyb. 4 Mm Hyb. 3	5.938 6.189	34.0 34.4	17.5 18.0	88.9	33 26	245 211	430 350	82 98	3.7 3.1	3.2 2.8
Mm Hyb. 2 MM Hyb. 1	6.281	36.2 36.5	17.4	89.3	34 22	229	350 430	88 93	3.7 3.6	3.4 3.1
General MEAN of all varieties	5.911	33.4	17.7	89.6	29	219	372			
S. E. of MEAN	0.20	1.01	0.19	0.80	3	7_	21			
Sig. Diff (19:1)	0.59	2.93	NS	NS	10	20	60			
S. E of MEAN in % of MEAN	3.38	3.02	1.07	0.893	10.	3 3.20	5.65			

VARIETY CODE		VARIETY AND PARENTAGE	CURRENT NUMBER	FIELD CODE
mm Hyb. SLC 15 mm	10 9	421+1 aa mm X Curly-top susc. mm Self-sterile monogerm SLC 151	54.3+2 SLC 15	3027 0015
mm Hyb. US 41	8 7	421+1 aa mm X mm Group US 41	53+2 028	3018 0028
MM Hyb.	6 5	US 22 MS (401H6) X (US 35 aa X CT9) 428HlO MS mm X SLC 117 mm	509н6 536н20	2005 3013
Mm Hyb.	4 3	(610 X 91) MS mm X (US 35 aa X CT9) 428Hl00 MS mm X (US 35 aa X CT9)	509H15 509H21	3002 3003
Mm Hyb.	2	23H15 MS MS X (US 35 aa X Klein E) CT9 MS Hyb. X (US 35 aa X Klein E)	F54-4H21 F54-4H7	1003 1002

Designations:

mm Hyb. = Both parents monogerm

Mm Hyb. = 99 monogerm, o' multigerm
MM Hyb. = Both parents multigerm

⁻SIC 15 is a self-sterile population developed by Dr. V. F. Savitsky

COL CHAIL BEING MAIN ASSESSMENT CO.

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0.E S.S.,	4.8 0.8					
S.2 8.9				88 8.02		
					17.4	
		SYČ				
			10.5			

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- 39 - VARIETY TEST, TWIN FALLS, IDAHO, 1956

(4 replicated plots of each variety)

TEST II

VARIETY CODE		ACRE SUGAR	YIELD BEETS	SUCROSE	DIIDTAN	8.7		AMINO	BEETS		ET WT.
	1	Tor			PURITY	P. p	K er 10	N 00,000	100'	PLOT	SAMPLE
MM Hyb.	10 9	5.432 5.600	29.1	18.7	89.80	15	184	450 400	98 90	2.7	2.6
Mm Hyb.	8 7	5.846 5.957	32.4 34.8	18.1	89.8 89.3	16 31	204	420 380	99 99	2.9	2.8
MM Hyb.	6 5	5.960 6.008	32.7 34.8	18.3 17.3	89.6 89.7	14 24	202	480 400	99 98	3.0 3.2	2.5
Mm Hyb.	4	6.053 6.240	33.8 35.1	17.9 17.8	89.6 90.3	20 25	205	390 350	88 108	3.5 2.9	3.2 2.7
MM Hyb.	2	6.306 6.515	35.1 36.9	18.0	91.4 90.4	25 27	215 207	390 420	86 104	3.7 3.2	3.1 2.8
General MEAN all varieties	of	5.992	33.5	17.9	89.9	21	208	407			
S. E. of MEAN		0.13	0.76	0.14	0.66	2	7	25			
Sig. Diff. (19	9:1)	0.37	2.21	0.41	1.91	6	21	71			
S. E. of MEAN in % of MEAN		2.17	2.27	0.78	0.734	9.52	3.37				

VARIETY CODE		PARENTAGE				CURRENT NUMBER	FIELD CODE
MM Hyb.	10 9 8	US 22 MS (211H3) do. do.	×××	MM	Line 289 Line 5060 Line 5030	5080H3 5060H3 5030H3	2030 2016 2011
Mm Hyb. MM Hyb.	7	do.	×		Line 5110 Line 287 (CT7)	5110H3 5070H3	2036 2023
11	5	do.	X		202 sel. 50 (Group of MM)	502H3 50H3	2066 2063
Mm Hyb. MM Hyb. Mm Hyb.	3 2 1	do. do. do.	×××	HB	Line 532 Line CT9 (new) SLC 117	532H3 5090H3 534H3	2007 2034 2078

Designations:

MM = Both parents multigerm

Mn = 2 multigerm, o' monogerm

II TENT

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	1001			
T.S.				
12.9		1500		
3.5 8.9		390		

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VARIETY TEST, TWIN FALLS, IDAHO, 1956

(4 replicated plots of each variety)

TEST III

VARIETY CODE	ACRE SUGAR To	YIELD BEETS	SUCROSE	PURITY		K	mino N	BEETS	PLOT	EET WT.
10 9	5.295 5.549	27.7	19.2	89.9 89.9	11 13	180 193	520 420	88 96	2.9	2.0 2.7
8 7	5.686 5.723	31.2	18.2 18.1	88.9 88.8	12 15	186 215	480 450	95 95	3.0 3.0	3.0 2.8
6 5	5.741 5.792	32.2 32. 6	17.8	90.1	18 20	199 201	340 330	86 92	3.4 3.2	2.6
4 3	5.999 6.031	33.0 33.1	18.2	90.4	14 19	500 505	420 360	90 .	3.3 2.9	2.2
5	6.032 6.160	32.8 34.9	18.4	89.7	15 20	218 207	430 370	95 96	3.1 3.3	2.8
General MEAN of all varieties	5.800	32.0	18.1	89.9	16	200	412			
S. E. of MEAN Sig. Diff. (19:1)	0.13	0.70	0.11	0.45	2 5	6 16	24 70			
S. E. of MEAN in % of MEAN	2.24	2.19	0.61	0.50	1.25	3.00	3.43			

VARIETY CODE	PARENTAGE			CURRENT NUMBER	FIELD CODE
10 9	US 35 aa MM 287 aa	×	MM Line 289 SL 202 sel.	5080+5 502+287	2024
8 7	US 35 aa	X	MM Line 287 MM Line 5030	5070+5 5030+5	2017 2008
6 5	US 35 Hyb. aa	×	us 201 <u>1</u> /	506+7 506+6	2004
4 3	US 35 aa MM 157 aa	×	SL 50 Group MM Lines SL 202 sel.	50+5 502+1 5 7	2037 2001
2	US 35 aa	X	MM Line 5060 CT9 (new)	5060+5 4090+5	2012

Remarks: All hybrids are multigerm

US 201 was developed at Beltsville, Maryland. It is curly-top susceptible but very high in Cercospora leaf-spot resistance.

On ...

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					S. 0.1 0.432	
0.6 8.2					5.81 1.61	\$. St 1 . LT
3.9 4.9				1.00 3.00		
		096 096	908 908			
	1.8 6.8	430	8 CG			
				eD		
			00.8		10.0	

5070+5 2008 \$050+5 2005 \$06+6 2005 \$06+6 2005 \$06+6 2005 \$082187 2002

TOLE LULEDO

1001 SHOOM

VARIETAL REACTION OF SUGAR BEETS TO CURLY TOP

VIRUS STRAIN 11 UNDER FIELD CONDITIONS

By Albert M. Murphy, C. W. Bennett, and F. V. Owen

Introduction

It has been established that the virus which causes the curly-top disease of sugar beet is a complex of strains that vary in virulence from those that cause little injury, even on susceptible varieties of sugar beet, to those that are capable of causing appreciable damage to the most resistant varieties. One of the most virulent of these strains was isolated from beets from Jerome, Idaho, and designated by N. J. Giddings as "Strain ll". This strain was used for field inoculations on two hybrid sugar-beet varieties in 1956. One of the varieties, carrying the current breeding number 92M1, is considered to be highly resistant to curly top. The other hybrid, F54-4H7, is somewhat less resistant to curly top due to the fact that one of its grandparents, Klein E (known also as R. & G. Old Type), a high-yielding German variety, is very low in curly-top resistance.

Method

Each of the two varieties was planted on June 6, 1956, in an area 75 feet long and 16 rows wide, with rows 22 inches apart. Each 75-foot planting was in turn divided into three 25-foot plots. The plants in each eight middle rows of the center 25-foot plots were inoculated with curly-top virus strain 11. The four outside rows of each planting were considered buffer rows and were not used for the purpose of obtaining data. Inoculations were made by caging one beet leafhopper (Circulifer tenellus (Baker)) on each plant. The leafhoppers were reared in a greenhouse at the U.S. Agricultural Research Station, Salinas, California, on beets infected with virus strain 11.

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The test was conducted in a beet-breeding field at Jerome, Idaho, where natural exposure to curly top had been augmented, to a certain extent, by artificial means. All plants of the area, including the two varieties under test, were exposed to natural infection throughout the season.

Results

Natural exposure to curly top, under the conditions of the test, was severe enough to destroy completely the susceptible variety, Klein E, and severely damage US 33, a variety of intermediate curly-top resistance, planted in the same general area and on the same date (June 6) as the test plots. US 33 was given a curly-top grade of 6 which indicates severe damage.

Table 1 shows the results of the reaction of varieties 92Ml and F54-4H7 following inoculation with virus strain 11. Each of these

Table 1

Reaction of two sugar-beet varieties to curly-top virus strain 11,

following field inoculation of seedling plants

by means of one leafhopper per plant.

Variety	Acre in I	Mield Mons Inoc.	Curly top Septemb Not Inoc.	er 1	Beets per of row at Not Inoc.	
92ML	15.29	4.75	1 3	5	91	59
F54-4H7	11.55	3.96		7	92	52

A/Figures represent degrees of severity of injury in ascending order from 1 to 9, inclusive; 0 would indicate no injury or not obvious infection.

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varieties gave a satisfactory yield under conditions under which Klein E (high susceptibility) was destroyed, and US 33 (medium resistance) failed to produce a commercial crop. This is indicated by the yields, shown in Table 1, from the "not inoculated" plots which were exposed only to natural infection. However, when the varieties 92Ml and F54-4H7 were inoculated with the highly virulent strain 11, using only a single leafhopper per plant, the yield was reduced by about two thirds and the stand by about one half, over those produced by natural infection.

Conclusions

The results of this test indicate that curly-top virus strains may occur in Idaho, and perhaps in other areas, that are capable of causing severe damage to varieties of sugar beets that are highly resistant to most of the virus strains prevalent under natural conditions. They emphasize the desirability of working with strains of known virulence in breeding in the future for greater resistance to curly top in sugar beets.

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provide of this test majores that emily work as strains meaning finals, and passing a court are capenas of equality as an action of sugar house that the highly resistant to virus strains immediate when mitted conditions. They will strains of the desirability of working with strains of the following with strains of the following with strains of the sugar following with the surface of working with the strains of the strains of the strains of the strains of the surface of the surface

PARTIII

DEVELOPMENT AND EVALUATION

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INBRED LINES AND HYBRID VARIETIES

of

SUGAR BEETS

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CALIFORNIA

J. S. McFarlane Charles Price Don Fife

Union Sugar Division Holly Sugar Corporation Spreckels Sugar Company DEVELOPMENT AND UNLARGED

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REPORT ON FOUNDATION PROJECT 24 Highlights of Accomplishments

J. S. McFarlane

Project 24 has as its main objective the development of breeding stocks which combine resistance to bolting and curly top. Attention is also given to selection for downy mildew resistance and to inheritance studies with bolting and mildew resistance. A small project was started in 1956 aimed at the development of tetraploid and triploid strains of sugar beets. The following progress is reported for 1956:

MONOGERM BREEDING. -- Significent progress made during 1956 in the development of monogerm inbred lines which combine resistance to bolting and curly top. A group of 48 bolting resistant monogerm inbreds which had been selected at Salinas were tested at Jerome, Idaho by Albert Murphy for curly-top. resistance. Of these, twelve showed resistance superior to that of US 33.

Backcrosses of bolting resistant monogerm inbreds to US 75 and to the bolting resistant US 35/2 were grown in 1956 and S_1 seed was harvested from the most bolting resistant segregates. Attention was also placed on those segregates which showed tolerance to the yellowing phase of virus yellows. More than one-half acre of these S_1 seed lots was planted at Salinas in September 1956. Monogerm segregates will be selected in 1957 which are highly resistant to bolting.

Work was also done on the development of bolting resistant self-sterile monogerm breeding stocks. F2 seed to obtained in 1956 from a cross between US 75 and a self-sterile monogerm, SL320. F2 seed to also obtained from a cross between to bolting resistant selection from US 35/2 and SL320. These F2 populations were planted in September 1956 for the purpose of making self-sterile monogerm selections which combine curly-top and bolting resistance.

BOLTING RESISTANCE. —In addition to the work with bolting resistant monogerm lines, testing was continued with extremely resistant multigerm inbreds. The results of a cooperative bolting test conducted at Tracy, California by the Holly Sugar Corporation demonstrate that F₁ hybrids can be produced which are superior in bolting resistance to our present commercial varieties. Results of this test, which was planted on November 17, 1955, are shown belows:

Variety	Description	Percent bolting
551 2H1	4547HO = 5512	1.6
5554Hl	MS of NBl = NB4	2.3
368	US 75	18.5

Each of the four inbred components of the bolting resistant hybrids described above can be reproduced when planted in July or early August in the seed producing areas of Oregon. The inbreds, NBl and NB4, have performed well in hybrids and have been released through the Foundation. The results of combining ability tests have not been especially promising with 5512 and 4547HO.

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DOWNY MILDEW RESISTANCE.—Although 20 new selections for downy mildew resistance were made in 1956, work was continued on the development of the male sterile equivalents of highly resistant inbred lines. Hybrids were made between bolting resistant monogerm lines and highly mildew resistant multigerm inbreds. Test quantities of seed were produced of two multigerm hybrid combinations involving mildew resistant parents. This seed has been made available for tests in those areas subject to mildew.

INHERITANCE STUDIES.—A series of hybrids between different bolting resistant genotypes and between bolting resistant and easy bolting genotypes were made for the purpose of learning more regarding the inheritance of bolting resistance. A difference has been observed in the bolting behavior of certain inbred lines at Medford, Oregon and Salinas, California. In order to learn more regarding the effect of environment on the bolting behavior of different genotypes, several bolting resistant inbreds and hybrid combinations were planted at Salinas, Tehachapi, Tracy, Salem, Medford, and Phoenix in the fall of 1956. Cooperating in these tests are the West Coast Beet Seed Company, Western Seed Production Corporation, and Holly Sugar Corporation.

Inheritance studies conducted during the past three years show that downy mildew resistance is partially dominant. The value of this dominance in developing mildew resistant varieties was demonstrated in the variety tests at Salinas in 1956. Hybrids in which one of the parents was mildew resistant showed less than 0.5 percent mildew whereas a moderately susceptible variety showed 14 percent mildew.

EVALUATION AND COMBINING ABILITY TESTS. Tests to determine the combining ability of new inbreds and to evaluate new selections were made at Salinas and Brawley. Cooperative company tests were also grown at Tracy, Guadalupe, and Dixon. A summary of these tests is shown in tables 1 and 2. The better yielding hybrids produced sugar yields which were consistently 5-20 per cent above the yields of US 56/2 and US 75. The sucrose percentages of these hybrids were superior to that of US 75, and were comparable to that of US 56/2. The hybrid, MS of NB1 x NB4, performed well in all locations. In addition to its ability to yield well, this hybrid also has excellent bolting and mildew resistance and is moderately resistant to curly top. The inbred, NB4, lacks vigor and it is doubtful that seed of the F1 hybrid could be produced economically for direct use as a commercial variety. However, the F1 has proved to be male sterile so it may be used as the female parent in a three-way commercial hybrid.

SEED RELEASES.—A total of eleven new breeders' strains and elite seed stocks were released through the Foundation in 1956. Included wire bolting resistant selections, Mendelian male sterile lines from US 75 and US 35/2, Type O lines, and a new bolting resistant inbred designated NB4.

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TYPE O SELECTIONS. Type O selections were made from bolting resistant selection of US 35/2, from Klein E, and from US 15. A composite increase was made of all the bolting, curly-top resistant Type O selections which had been made at Salinas during the past eight years. Seed from this increase was made available through the Foundation.

TETRAPLOIDY. -- Since the tetraploid project was started in the spring of 1956 a total of 650 plants have been selected which showed morphological distortions following colchicine treatment of sprouted seed. These plants have been induced to bolt and now being checked for pollen size. To date, 62 plants have been selected which have large pollen grains characteristic of tetraploids. These plants are being selfed or crossed in pairs. Cytological examination will need to be made of the progenies.

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Table 1. Gross sugar yields of bolting resistant hybrids, commercial varieties, and selections in 1956 California variety tests expressed in percent of the yield of US 75.

Variety description		I	ocation o	f Test		
	Brawley	Salinas	Salinas	Guadalupe	Tracy	Dixon
MS of NBl x NB4	109	107	116	1.35	121	120
MS of NBl x NB3	117	-	COM	1.20	105	107
(MS of NB1 x NB2) = 581	108	102	109	900	117	113
(MS of NB1 x NB2) x 581	104	***	198	116	109	114
MS of NBl x NB2	200	104	me	125	102	105
5547HO = 5512	93	108	105	117	-	-
(MS of NB1 x NB2) x 5547	89	98	97	128	101	98
US 75	100	100	100	100	100	100
US 56/2	86	97	94	100	93	100
NB sel. US 35/2 (581)	91	88	91	99	99	95

Table 2. Sucrose percentages of bolting resistant hybrids, commercial varieties, and selections in 1956 California variety tests.

Variety description		I	ocation o	f Test		
	Brawley	Salinas	Salinas	Guadalupe	Tracy	Dixon
MS of NBl x NB4 MS of NBl x NB3	14.5	16.9	16.2	16.5 17.0	12.3	15.1
(MS of NBl = NB2) x 581 (MS of NBl = NB3) x 581	15.0 14.9	17.8	17.0	17.3	13.2	15.5 15.7
MS of NBl = NB2 5547HO x 5512	14.8	17.6	16.3	16.9 15.2	12.4	15.5
(MS of NBl x NB2) x 5547 US 75	15.2 14.0	17.2 17.4	16.8	16.4	12.8	15.4
US 56/2 NB sel. US 35/2 (581)	14.9 15.4	17.1	16.3 16.7	16.8	13.2	15.1 15.8

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16.6		16.9		17.8	u.bl
	0.81		4.01		
		3.01			14.8

VARIETY TEST, SALINAS, CALIFORNIA, 1956 December Plantings

By J. S. McFarlane

Location: Spence Field of the U. S. Agricultural Research Station.

Soil type: Sandy loam.

Previous crops: Barley green manure, 1954 and 1955; guayule, 1953.

Fertilizer useds 400 lbs. per acre (16-20) preplant

200 ammonium sulfate, February 15 200 ammonium sulfate, February 15 May 7 200 ammonium sulfate, February 15

Planting date: December 15, 1955

Thinning date: February 13-15, 1956

Harvest date: September 20-26, 1956

Irrigations: At 10-day intervals, beginning March 23, and continuing throughout the growing season.

Experimental designs Randomized block with 10 replications for first test and randomized block with 5 replications for second test. Varieties planted in 2-row plots with rows spaced 28 inches apart. Plots 55 feet long.

Diseases and insects: Downy mildew was moderately severe in susceptible varieties. Virus yellows infection occurred late in the season and caused relatively little damage. The tests were sprayed at weekly to 10-day intervals with metaphos and malathion for aphid control beginning March 23 and continuing to July 27. A build up of green peach aphis occurred in August and caused some foliage damage before they could be brought under control. Metaphos and malathion proved ineffective during this late aphid infestation and it are necessary to use phosdrin to obtain control.

Sugar analyses: From frozen samples by C. H. Smith at Salt Lake City, Utah.

Sodium, potassium and nitrogen analyses: From frozen samples by Myron Stout at Salt Lake City, Utah.

Statistical analyses: By G. K. Ryser and J. S. McFarlane.

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VARIETY TEST, SALIMAS, CALIFORNIA, 1956

(10 replicated plots of each variety)

Planted December 14, 1955

		Acre II	75 10					Amino			DALTEST
Variety	Description	Sugar	Beets	Sucrose	Purity	Na	K	×	Bolting	Mildew	count
		Pounds	Tons	Percent	Percent	p.p.m.	p.p.m.	Percent	Percent	Percent	Number
5512日1	4547E0 ■ 5512	12,594	36.6	17.2	91.4	145	1,384	0.16	0.2	10	166
5554H1	MS of NB1 = NB4	12,437	36.8	16.9	91.1	100	1,794	0.20	4.6	0	148
581E2	(MS of NB1 = NB2) x 581	11,898	33.3	17.8	90.4	98	1,579	0.22	13.3	4.8	142
868	US 75	11,639	33.4	17.4	90.2	145	1,739	0.22	1.3	1.6	171
5547H2	(MS of NB1 = NB2) = 5547	11,432	35.3	17.2	91.2	95	1,459	0.17	8° 50	1.8	150
463	NB, CT sel. US15 x US22/3	11,422	34.4	16.6	89.2	197	2,000	0.24	0.4	5.4	165
5554日2	4504-15E0 = NB4	11,381	34.5	16.5	90.5	164	1,796	0.20	10.1	0.2	158
459	US 56/2	11,301	33.1	17.1	89.9	171	1,694	0.22	6.4	1.7	161
	NB, CT sel. US 35/2	10,271	29.3	17.5	89.6	141	1,657	0.26	0 0	4.0	156
General MEAN of	AN of						The second secon				
all varieties	ies	11,597	33.8	17.1	90.4	139	1,678	0.21	5.7	2.64	Beets
E. Of MEAN	EAN	419	1.27	0.14	0.31	12,17	38.5	0.019	0.72	0.63	red
nifica	Significant Difference (19:1)	1,180	3.6	0.4	6.0	34	109	0.05	2.0	00 e	1000
· E. of MEAN	EAN										row
in % of MEAN	AN	3.61	3.75	0.81	0.34	8.74	2.29	000	12,63	23,86	

VARIANCE TABLE

Tone Percent Na E Amino Fercent Percent Percent Percent Poles sucrose purity p.p.m. p.p.m. N bolting m beets sucrose purity p.p.m. p.p.m. N bolting m becase 5.89 13,102,0 349,600 .00903 207.34 56.45 0.36 6.44 2,494.0 84,162 .00784 14.36 16.11 0.19 0.97 1,483.1 14.83.1 14.525 .00346 5.18 3.05** 9.79** 6.07** 8.83** 23.58** 2.61* 40.03**		Degrees					EANSOU	A K K			
freedom Gross sugar beets sucrose purity p.p.m. p.p.m. N bolting m bolting m black beets sucrose purity p.p.m. p.p.m. N bolting m bolting m black beets sucrose purity p.p.m. p.p.m. N bolting m bolting m believed by the second beets sucrose purity p.p.m. N bolting m	Fariation due to	of	Tons	Tons	Percent	Percent	N	A	Amino	Percent	Percent
8 1.017006 49.08 1.86 5.89 15,102.0 349,600 .00903 207.34 1.09904 56.45 0.86 6.44 2,494.0 84,162 .00784 14.36 72 0.43888 16.11 0.19 0.97 1,483.1 14.35 .00346 5.18 89 2.67* 5.05** 9.79** 6.07** 8.83** 2.51* 40.03**		freedom	Gross sugar	beets	sucrose	purity	p.p.m.	p.p.m.	Z	bolting	mildem
s 1.99004 56.45 0.36 6.44 2,494.0 84,162 .00784 14.36 172 0.43888 16.11 0.19 0.97 1,483.1 14,825 .00346 5.18 89	etween varieties	ထ	1,17006	49.08	1.86	5.89	13,102.0	349,600	\$0600	207,34	42,15
72 0.43888 16.11 0.19 0.97 1,483.1 14,625 .00346 5.18 89 2.67* 5.05** 9.79** 6.07** 8.83** 2.51* 40.03**	etween replications	0	1,99004	56.45	0.36	6.44	2,494.0	84,162	€00784	14.36	17.04
89 2.67* 5.05** 9.79** 6.07** 8.83** 2.58* 2.61* 40.03**	emainder (Error)	72	0.43888	16.11	0.19	26.0	1,483.1	14,825	.00346	5,18	4.02
2.67* 5.05** 9.79** 6.07** 8.83** 2.58** 2.61* 40.03**	Total	89									
	alculated F values		2.67*	3.05**	9.79**	6.07**	8.83**	23.58**	2.61*	40.03**	10.49**

^{*} Exceeds the 5% point of significance (F = 2.07) ** Exceeds the 1% point of significance (F = 2.77)

VARIETY TEST, SALINAS, CALIFORNIA, 1956

Planted December 14, 1955

(5 replicated plots of each variety)

		Acre Yie	ield					Amino			Earvest
Variety	Description	Sugar	Beets	Sucrose	Purity	Na	X	N	Bolting	Mildem	count
		Pounds	Tons	Percent	Percent	ророто	P.P.m.	Percent	Percent	Percent	Number
5512E2	NB sel. US 35aa = 5512	12,297	34.7	17.7	89.0	162	1,510	0.24	0.5	64	163
5511H1	MS of NB1 x NB2	12,257	34.9	17.6	0.06	88	1,450	0.19	₩.0	8.9	144
5554H3	4504-69HO = NB4	12,234	35.2	17.4	90.1	128	1,760	0.22	4.7	0.1	164
X59-High	Ulrich high sugar sel.US75	12,195	35.4	17.2	89.8	176	1,660	0.19	9.9	80.	174
511	Virus vel. tolerant sel.	12.056	600	17.8	8.08	170	1 700	0.20	0	2	151
587	NB sel. US 75	11,957	35.1	17.0	88.9	176	1.740	0.25	4.0	- PC	167
368	US 75	11,832	34.0	17.4	0.06	164	1.760	0.23	8	1,99	165
215	Virus yel. susc. sel.	11,042	32.3	17.1	89.5	166	1,810	0.24	3.0	1.6	141
578	CT sel. US 75	10,564	31,3	16.9	87.9	230	2,090	0.30	0.0	20	159
465	NB, CT sel. US56/2 x US22/3 10,559	10,559	30.1	17.5	89.7	188	1,640	0.24	F	100	164
X59-Low	Ulrich low sugar sel. US75	10,204	31.1	16.4	88.5	228	1,870	0.31	5.5	(D)	159
586	NB sel. US 35/2	9,540	27.5	17.4	88.1	166	1,610	0.27	1.5	6.3	155
General MEAN of	EAN of										
all varieties	sties	11,394	53.0	17.3	89.4	170	1,717	0.24	3.0	2.53	Beets
S. E. of WEAN	MEAN	358	3.99	0.25		20.53	44.0	0.023	0.57	0.31	Der
Significe	Significant Difference (19:1)	1,012	2.8	0.69		58	124	0.06	1.6	6.0	1001
S. E. of NEAN	NEAN	3.14	00-8	1.42		12.08	0 20	0 50	70 01	32 40	row
-		-		1 0 5		T.C. O.C.	2002	0000	TOOOT	10000	

Odds 19:1 = V 2 = Standard Error of Mean

VARIANCE TABLE

	Degrees				MEA	MEAN SQUARES	RES		
Variation due to	of	Pounds	Tons	Percent	N	K	Amino	Percent	Percent
	freedom	Gross sugar	beets	sucrose	p.p.m.	p.p.m.	N	bolting	mildew
De de la companya de		000 000 4							
Dermen Agileries	11	4,6US, OLS	01010	0.74	7,263,45	140,910	•0073	43.47	14.52
Between replications	4	4,260,400	22,05	0.44	822,50	57,427	-0045	2.04	23,69
Remainder (Error)	44	640,099	4.89	0.30	2,107,05	9.674	0026	1.60	0.48
Total	59								
Calculated F values		7.51**	6.37**	2.47*	3.45**	14.57**	2.81**	27.17**	30.25**
* Exceeds the 5% point of significance (F = 2.01)	significance	(F = 2.01)	** Exceeds	the 1% po	the 1% point of significance (F = 2.68)	icance (F =	2,68)		

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VARIETY TEST, SALINAS, CALIFORNIA, 1956 February plantings

By J. S. McFarlane

Location: Spence Field of the U. S. Agricultural Research Station. Soil type: Sandy loam.

Previous crops: Barley green manure, 1954 and 1965; guayule, 1963.

Fortilizer used: 400 lbs. per acre (16-20) preplant
200 m m ammonium sulfate, May 9
200 m m June 14

Planting dates February 8, 1966.

Thinning date: March 21, 1956.

Harvest date: September 19-20, 1956.

Irrigations: At 10-day intervals, beginning March 23 and continuing throughout the growing season.

Experimental design: Randomized block with 10 replications. Varieties planted in 2-row plots with rows spaced 28 inches apart.

Plots 15 feet long.

Diseases and insects: Same as for the December plantings at Salinas.

Sugar analyses: From frozen samples by C. H. Smith at Salt Lake City, Utah.

Sodium, Potassium, and nitrogen analyses: From frozen samples by Myron Stout at Salt Lake City, Utah.

Statistical analyses: By G. K. Ryser and J. S. McFarlane.

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VARIETY TEST, SALINAS, CALIFORNIA, 1956

Planted February 8, 1956

(10 replicated plots of each variety)

Acre
Sugar Beets Pounds Tons
6,739 19,8
6,288 20.6
6,189 19.0
5,975 17,7
5,808 17,8
525 1.3
2.96 2.32

7/2 x Standard Error of Mean C) Odds 19:1 =_

VARIANCE TABLE

9.02** 14.55** Percent 256.38 65.14 17.62 Wildew .0033800 .0060475 Amino Z 27,97** 444,579 23,986 15,895 P.P.III. M SQUARES 7.07** 7,349 p.p.m. Na MEAN Percent 4.10** purity 5.82 10.67** sucrose Percent 3.20 13,80** 27.60 beets Tons Gross sugar 0.39168 0.59907 6.95** Tons freedom Degrees of 72 0 2 89 Between replications Remainder (Error) Calculated F values Between varieties 40 Variation due Total

^{**} Exceeds the 1% point of significance (F & 2.77)

				54 5- 60 5- 6- 60 5- 6- 10-	50.0	A
				F. 100 0.12		
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VARIETY TEST, BRAWLEY, CALIFORNIA, 1955-1956

By Charles Price and Don Fife

The test we located at the Southwestern Irrigation Field Station,

U. S. Department of Agriculture, near Brawley, California. The previous

crop history on the land has been one of flax in 1954 and cotton in 1955.

The land for the test we prepared by tillage and beets were planted in

single-row beds, 30 inches apart. The planting date was September 8, 1955

and the irrigation date September 9, 1955. The beets were spaced approximately 8 inches apart in the row and good stand we secured in all plots.

entire growing season. The beet army-worm attacked the beets before they were thinned, and it me necessary to spray them September 19. A mixture of Toxaphene and D.D.T. was used successfully. Following this, invasion of crickets was controlled successfully with poison bran mash. Cabbage looper and beet leafhoppers were controlled successfully with Toxaphene and D.D.T. A side dressing of 16-20-0 was applied at the rate of 400 pounds per acre on October 3, 1955. Four hundred pounds of ammonium nitrate, as side dressing, applied November 15, 1955. The plots were harvested May 3, 1956.

Plots consisted of two rows, 50 feet long, and the entire plots were harvested for yield data. Two samples of 10 beets each were taken for sugar determinations on each of the six replications for each variety. The experimental design balanced lattice with six replications of each variety. The data were analyzed as a randomized block.

There was evidence of some curly-top damage but the high yields in all plots would indicate that the damage and not severe. The repeated dusting and spraying for insect control probably are responsible for keeping the curly-top damage at a minimum.

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VARIETY TEST, BRAWLEY, CALIFORNIA, 1956

(6 replicated plots of each variety)

Charles Price and Don Fife

			Acre Yield			
Variety	Description	Sugar	Beets	Sucrose	Purity	count
		Pounds	Tons	Percent	Percent	Number
5509H2	MS of NBl x NB3	11,985	41.5	14.44	82.57	127
1554H1	(MS of NB3 x NB1) = NB4	11,333	41.1	13.78	86.33	118
5554H1	MS of NBl x NB4	11,218	38.8	14.46	86.47	127
581H2	(MS of NB1 = NB2) = 581	11,048	37.0	14.95	82.57	114
63	NB, CT sel. US 15 = US 22/3	10,873	38.0	14.31	84.22	118
581H1	(MS of NB1 = NB3) = 581	10,703	35.9	14.89	84.87	118
165Hl	(MS of NBl = NB2) = 465	10,528	34.3	15.36	81.48	115
3511H1	MS of NBl x NB2	10,469	34.5	15.16	82.66	120
5554H2	4504-15H0 x NB4	10,396	37.3	13.94	83.65	123
202	F ₂ (US 22/4 x US 35/2)	10.350	36.9	14.02	85.40	122
368	US 75	10,252	36.6	13.99	81.78	120
X59-H	Ulrich high sugar sel. US 75	10,223	36.3	14.10	83.03	125
579	Price's sel. from US 75	10,207	34.5	14.81	83.42	122
466H1	(MS of NBl x NB2) = 366	10.034	32.2	15.60	84.74	122
579	Price's sel. from US 75	9,903	33.3	14.86	87.73	120
5512H1	4547HO x 5512	9,486	32.1	14.78	82.77	122
554 7 Hl	(MS of NBl = NB3) x 5547	9,479	32.3	14.66	84.60	114
581	CT sel. 366	9,363	30.4	15.40	85.62	113
165	NB, CT sel. US 56/2 x US 22/3	9,316	31.4	14.83	85.78	119
366	NB sel. US 35/2	9,248	30.3	15.26	86.18	119
K59-L	Ulrich low sugar sel. US 75	9,230	33.3	13.85	82.40	115
5547H2	(MS of NB1 = NB2) = 5547	9,135	30.1	15.16	84.92	122
459	1954 stock seed US 56/2	9,062	30.8	14.73	82.68	114
3 59	1948	8,800	29.5	14.94	84.78	104
General M	EAN of			7.4.00		
all varie		10,110	34.5	14.68		D1
S. E. of	MEAN	4481		U- 27		Boots
	nt difference (19:1)	1,254	3.9	0.76		per 100
S. E. of	mean Ban	4.43	4.03	1.84		row

(Odds 19:1 = 1.98 \(\sigma \times \text{Standard Error of Mean}\) 1/ By short-cut formula.

VARIANCE TABLE

	Degrees	MEAN SQU	TARES
Variation due to	of freedom	Tons beets	Percent sucrose
Between varieties	23	71.53	1.67
Between replications	9	39.44	4.46
Remainder (Error)	115	11.59	0.44
Total	143		
Calculated F value		6.17**	3.80**

** Exceeds the 1% point of significance (F = 1.94)

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VARIETY TEST, TRACY, CALIFORNIA, 1956

(9 replicated plots of each variety)

By Holly Sugar Corporation

771 - A	75	Acre Yield				Harvest
Variety	Description	Sugar	Beets	Sucrose	Curly Top	count
		Pounds	Tons	Percent	Percent	Number
5554H1	MS of NBl x NB4	8,836	35.947	12.29	99.4	192
581H2	(MS of NBl x NB2) x 581	8.585	32.642	13.15	17.6	182
581H1	(MS of NB1 = NB3) x 581	7,957	30.299	13.13	7.3	179
SL509H21	428H100mm x (824aa x New CT 9)	7,880	29.580	13.32	6.0	191
SL509H6	401H6 x (824aa = New CT 9)	7,824	29.658	13.19	9.5	184
158-55	3151 NB lines	7,716	32.528	11.86	23.4	164
5509Hl	MS of NBl x NB3	7,690	30.181	12.74	3.7	181
51107-0	3151 NB lines	7,575	32.072	11.81	26.9	162
5511H1	MS of NB1 x NB2	7,431	29.941	12.41	14.4	176
5547H2	(MS of NB1 = NB2) x 5547	7.374	28.804	12.80	18.7	189
368	US 75 variety	7,321	30.605	11.96	15.5	179
81	NB, CT sel. US 35/2	7,211	27.191	13.26	7.9	182
5547H1	(MS of NBl x NB3) x 5547	6,769	27.857	12.15	9.1	188
2859	US 56/2 variety	6,754	25.661	13.16	94.7	176
SL536H20	428HlOMSmm x SLC117mm	6,516	24.116	13.51	7.2	186
5520H1 2/	MS of NB2 x 5520	5,218	21.023	12.41	95.6	162
eneral N						
ll varie		7,416	29.257	12.70	28.6	180
· E of	MEAN	218	/ 0.732	0.196		Beets
	nt difference (19 1)	612	2.050	0.55		100'
B. E. of In % of M		2.94	2.50	1.55		row

^{1/} By short-out formula

VARIANCE TABLE

	Degrees	MEAN S	QUARES
Variation due to	of freedom	Tons beets	Percent sucrose
Between varieties	15	115.757	2.942
Between replications	8	21.199	1.574
Remainder (Error)	120	4.291	0.347
Total	143		
Calculated F values		26.97**	8.47**

** Exceeds the 1% point of significance (F = 2.23)

Test was planted March 20, 1956 . the John Paulson ranch at Tracy, California and was harvested October 26, 1956. Previous crops included tomatoes in 1955 and alfalfa from 1952-54. 175 lbs. of N were applied (100 lbs. as ammonium nitrate preplant and 75 lbs. as aqua ammonia sidedressed.)

Test conducted by the Holly Sugar Corporation using a 4x4 triple lattice design and randomized block analysis. Plots consisted of 2 rows, 30 inches apart and 50 feet long. Curly top depressed yields in susceptible varieties. The hybrid, 5554Hl, showed uniformily mild symptoms but a not seriously damaged.

^{2/} Badly contaminated with swiss chard

PARTETY THE TRACE, CALLEGORIA, 1986

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VARIETY TEST, GUADALUPE, CALIFORNIA, 1956

(7 replicated plots of each variety)

By Union Sugar Division

		Acre	Yield		Harves
Variety	Description	Sugar	Beets	Sucrose	count
		Pounds	Tons	Percent	Number
5554Hl	MS of NBl NB4	6,945	20.9	16.5	148
5547H2	(MS of NB1 m NB2) m 5547	6,580	20.0	16.4	135
466H1	(MS of NBl m NB2) m Bolt. sel. US 35/2	6,532	19.1	17.0	136
5511H1	MS of NBl m NB2	8,438	19.0	16.9	141
5547Hl	(MS of NB1 = NB3) = 5547	6,327	19.0	16.6	130
4509Hl	MS of NBl x NB3	6,175	18.1	17.0	138
5512Hl	4547HO x 5512	6,039	19.7	16.8	137
581H1	(MS of NBl x NB3) = 681	5,999	17.3	17.3	136
5520H13/	MS of NB2 x 5520	5,953	18.7	15.9	129
368	US 75	5,160	16.2	15.9	149
169	US 56/2	5,135	15.0	16.8	142
581	NB, CT sel. US 35/2	5,122	14.6	17.3	129
General					
all vari		6,034	18.1	16.57	
s. E. of		334	0.95	0.29	Beets
	ant Difference (19:1)	945	2.70	0.26	per
s. E. of					100*
n % of	MEAN	5.54	5.26	1.77	LOM

(Odds 19:1 = 2 V 2 x Standard Error of Mean)

1/ 5520Hl badly contaminated with Swiss Chard hybrids

VARIANCE TABLE

	Degrees	MBA	NSQUAR	ES	
Variation due to	of freedom	Pounds Gross sugar	Tons beets	Percent sucrose	
Between varieties	11	2,581,066	27.56	2.8	
Between replications	0	20,628,798	144.59	4.3	
Remainder (Error)	86	781,196	6.57	0.6	
Total	83				
Calculated F values		3.30**	4.35**	4.67**	

** Exceeds the 1% point of significance (F = 2.54)

Test planted the Wolfe ranch, cromile east of Guadalupe, California in the west end of the Santa Maria valley of February 14, 1956 and harvested October 18, 1966. 100 lbs. of N (ammonium sulfate) applied. Previous crops included celery in 1955 and vegetables in 1963-54.

Test grown and harvested by Union Sugar. J. S. McFarlane furnished the seed and analyzed the results. Randomised block design. Plots planted on double row beds, 40 inches apart. Plots 60 feet long. Test damaged by the sugar beet nematode and virus yellows.

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VARIETY TEST, DIXON, CALIFORNIA, 1956

(6 replicated plots of each variety)

By Spreckels Sugar Company

		Acre	Yield		Harvest
Variety	Description	Sugar	Beets	Sucrose	count
		Pounds	Tons	Percent	Number
5554H1	MS of NBl x NB4	9,126	30.30	15.07	107
581H1	(MS of NB1 = NB3) x 581	8,640	27.58	15.66	108
581H2	(MS of NBl x NB2) = 581	8,548	27.52	15.53	104
A5404H	Spreckels variety	8,236	27.72	14.88	105
A5327	Spreckels variety	8,172	27.67	14.77	99
5509H1	MS of NB1 x NB3	8,102	27.40	14.73	100
5511H1	MS of NBl x NB2	7,948	25.67	15.48	106
IMC 5405	International Min. Corp. var.	7,748	25.32	15.30	100
US 56/2	US variety	7,628	25.23	15.13	103
A5410H	Spreckels variety	7,808	24.23	15.71	102
US 75	US variety	7,600	26.42	14.38	100
5547H2	(MS of NB1 x NB2) x 5547	7,450	24.08	15.42	100
581	N.B. CT res. sel. US 35/2	7,248	22.87	15.80	92
5547Hl	(MS of NBl x NB3) = 5547	7,236	23.73	15.30	100
General M	CAN of all varieties	7,768	25.61	15.17	101
S. E. of I		174	0.95	0.24	Beets pe
Significal	at Difference (19:1)	490	2.69	0.69	100 feet
	MEAN in % of MEAN	2.24	3.71	1.58	row

VARIANCE TABLE

Variation due to	Degrees of freedom	M E A N Pounds Gross sugar	SQUAR Tons beets	E S Percent sucrose
Between varieties	14	1,022,207	47.26	1.090
Between replications	5	358,001	19.69	1.870
Remainder (Error)	70	181,860	5.46	0.357
Total	89			
Calculated F value		542**	8.65**	3.05**

** Exceeds the 1% point of significance (F = 2.35)

Test was planted March 19, 1956 and harvested October 10, 1956. Randomized block design. Plots planted double row beds, 40 inches apart. Plots 40 feet long.

Test was conducted and analyzed by Spreckels Sugar Company. Included were U.S.D.A. varieties, Spreckels varieties, and one variety developed by the International Minerals Corporation. One variety, 5520Hl, omitted from the table because of severe swiss chard contamination.

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PART IV

VIRUS YELLOWS INVESTIGATIONS

FOUNDATION PROJECT 12

SALINAS, CALIFORNIA

C. W. Bennett

J. E. Duffus

J. S. McFarlane

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CALINAR CALIFORNIA

C. W. Bennett

J. E. Buffred

d. S. Maramo

FOUNDATION PROJECT 12

The funds, amounting to \$2,000, allotted in 1956 to Project 12 for research on virus diseases of sugar beet, were used almost entirely in connection with research on the virus yellows disease. The work, in which Foundation funds were used, consisted of studies of (1) the effect of aphid control on yellows incidence and (2) damage assessment tests conducted at Spence Field, Salinas. The following results were obtained in these tests.

STUDIES OF THE EFFECT OF APHID CONTROL ON

INCIDENCE OF VIRUS YELLOWS

By James E. Duffus

Work ... conducted in the field with the cooperation of Norman F. McCalley, University of California, to test the effect of chemical control of aphid populations on the incidence of virus yellows. Two systemic insecticides, System (Farbenfabriken Bayer) and Thimet (American Cyanamid), were used in replicated plot trials with applications at 18-day intervals or at intervals when aphid populations indicated an insecticide application was necessary. Information as gathered aphid movements into the field, aphid populations within the plots and incidence of virus yellows.

Water traps were used in a effort to determine the incidence of winged aphid flight in the experimental plots. An attempt and made to correlate trap data with winged aphid counts on a number of sugar-beet plants surrounding the traps. Apparently, no significant correlation obtained between these two types of data. Aphid population in the Salinas Valley and in particular the experimental plots at Spence field appear to have been much lower than are normally present in the area. The spread of virus yellows in experimental plots as lower than would ordinarily be expected. This probably and due to the lower aphid populations.

Seed treatment of sugar-beet seed with Thimet was found to be unnecessary for the control of aphid populations on seedling beets in the experimental plots. Although the systemic insecticide was capable of killing aphids for several weeks after the seed was planted, aphids were almost nonexistent during this period.

No effective control of the spread of virus yellows was obtained in these trials. Incidence of virus yellows appeared to run parallel in all plots, treatments and checks. Perhaps under different conditions of aphid population, the results would have been different.

It was noted, incidental to the yellows control studies, that leaf miner was effectively controlled by both seed treatment and by pellet application of the systemic insecticide Thimet.

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YELLOWS DAMAGE ASSESSMENT TEST, SPENCE FIELD, SALINAS, 1956

By C. W. Bennett and J. S. McFarlane

The 1956 yellows damage assessment test at Salinas ... conducted in field of the US 75 (C368) sugar beet variety, planted December 15, 1956, and thinned February I and 9, 1956. The beets were planted on single-row beds spaced 28 inches apart. A preplant application of ammonium phosphate (16-20) ... made at the rate of 400 lbs. per acre. Ammonium sulphate was applied as . side dressing at the rate of 200 lbs. per acre, February 15, Mey 1, and June 13. The planting was irrigated at 10-day intervals beginning March 23 and continuing throughout the growing season.

The test si in the form of a factorial experiment and included 6 treatments which consisted of inoculation with 2 strains of the yellows virus on 3 different dates. These 6 treatments plus a nontreated check were replicated 8 times and were randomized within the replications. The plots were 4 rows wide and 65 feet long.

The 2 middle rows of each of the 48 treatment plots were inoculated. The 2 virus strains used were strain 5, which produces vein clearing in young leaves and marked yellowing in old leaves, and strain 3, which produces no vein clearing but causes marked yellowing of foliage. The virulence of strain 3 probably closely approximates the average virulence of yellows virus prevalent in the Salinas Valley. Inoculations were made March 26, April 30, and June 5. All plots were sprayed the day following inoculation to destroy aphids applied to the plants, and the experimental area was sprayed at 7- to 10-day intervals, from thinning through July, to reduce natural spread.

The 2 middle rows of each plot were harvested September 17 end five 10-root samples were taken from each plot for sucrose determinations. Yields were calculated on the basis of weight of roots harvested from the middle 2 rows. The chemical determinations including sucrose, purity, sodium, potassium, and amino nitrogen were made from frozen pulp samples at Salt Lake City, Utah by C. H. Smith and Myron Stout. Mr. G. K. Ryser helped with the statistical analyses.

The inoculations resulted in a high percentage of infection in all of the plots inoculated with each of the virus strains. Yellowing was somewhat more evident in the plots inoculated with virus strain 5, particularly in plots inoculated earlier in the season. Aphid populations were lower than normal for the area during the early part of the season and it was possible to obtain a high degree of control of spread of yellows to the check plots during the greater part of the season. However, infection in check plots began to increase about the middle of July and on August 16, 23 percent of the check plants showed obvious symptons of yellows. Probably most of the check plants had yellows at the time of harvest (September 17).

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Results of this test are shown in tables 1 and 2. The statistical analyses show that the experimental error is low and that relatively small differences are needed for significance. A reduction was shown in tonnage of 14.3, 10.3, and 4.1 tons per acre, respectively for the three dates of inoculation with strain 5; and 7.8, 8.9, and 3.1 tons per acre, respectively for the three dates of inoculation with strain 3. The sucrose percentage was reduced by both strains of the virus. This reduction ranged from 1.0 to 2.2 percentage points. The gross sugar yield was reduced from 15 to 53 percent in the inoculated plots as compared with the non-treated checks.

Small, but statistically significant differences were demonstrated for purity and for sodium and potassium content. The results show that the purity of the beets inoculated with strain 5 was slightly lower than that of the beets inoculated with strain 3. The sodium and potassium contents were a little higher for strain 5 than for strain 3. Virus yellows had no measurable effect on the amino nitrogen content.

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Effect of wirulence of wirus strains and time of infection on injury to sugar beet caused by wirus yellows Table 1.

Strain of	Date of	Acre Yield	Held					Amino	Beet	Sugar yield in percent
virus used 1/ inoculation	inoculation	Sugar	Beets	Sucrose	Purity	Na	M	×	count	of check
		Pounds	Tons	Percent	Percent	ререше	p.p.m.	Percent	Number	
S.	Mar. 26	4,876	16.1	15.2	90.0	240	2,210	80°0	104	47
co.	Apr. 30	6,050	20.1	15.0	8.06	260	2,080	0.31	107	58
	June 5	8,352	26.3	15.9	1.16	210	2,010	0.28	103	80
10	Mar. 26	7,518	22.6	16.2	91.3	190	2,090	6.30	108	70
10	Apr. 30	6,630	21.5	15.4	91.3	260	2,020	0.50	000	63
9/3	June 5	8,864	27.3	16.2	92.1	190	1,960	0.24	101	80 00
Check		10,470	30.4	17.2	91.2	130	2,060	0.25	10	100
General MEAN 2		7,015	22.3	15.7	91.1	225	2,062	0.29	Beats	
S. E. of MESN Sig. diff. (19:1	.1)	157	1.19	0.40	1.08	11.7	134	0.026 NS	per 100	
		2.24	1.85	0.87	0.41	5.19	5	8.95	FOR	

(Odds 19:1 = 2 /2 x Standard Error of Mean)

1/ Virus strain 1 is one of the more virulent strains of the yellows virus and strain 1 is of medium virulence, as judged by effects of these strains on beets under greenhouse conditions.

2/ The check plots were omitted in computing the means and in the statistical analysis of the data.

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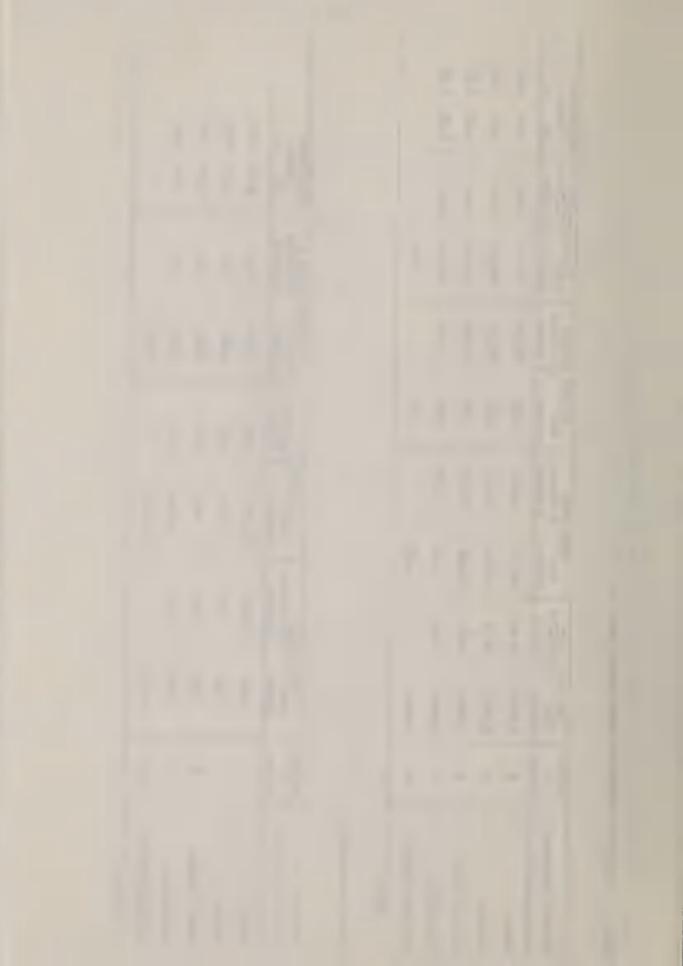
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Table 2. Analyses of variance for data shown in table 1.

	Degrees	Tons gr	ross sugar	Tone	Tons beets	Percei	Percent sucrose	Percei	it purity	Significant	Leant
Source of variation	of Free dom	Mean squares	Mean Calculated quares F values	Mean	Calculated F values	Mean	Calculated F values	Mean	san Calculated	F values	ues 1%
Dates	N	7.66869	154.80	249.61	183.54	2.85	19,00	4.17	3.69	3.26	5.25
Strains	-	4.16718	84.12	108,00	79.41	3.68	24.53	10.27	60°6	4.11	7.39
Dates = Strains	63	1,19925	24.21	37.92	27,88	0.54	3.60	69.0	0.61	3.26	5.25
Replications	7	0.18857	3.80	6.62	4.87	0.45	3,00	49.23	43.57	2.28	5.18
Remainder (Error)	35	0.04954		1.36		.15		1.13			
Remainder (Error)	35	0.04954		1.36		,15			1.13	13	50

Table = continued.

Source of variation	Degrees	Mean squares	Na(p.p.m.) Na(p.p.m.) Calculated nares F values	Mean squares	Mean Calculated Calculated F values	Mean	Percent Anino N Calculated Pos F values	Significant F values 5% 1%	loant nes
Dates	N	1,450	13,29	11,330	6.52	.01175	2,18	3,26	5.25
Strains	~	800	7.33	9,330	5.37	\$600.	1.72	4.11	7.39
Dates I Strains	63	220	2.02	565	0.33	8000*	0.15	3.26	5.25
Replications	7	640	4.95	5,384	3.10	.0042	0.78	2.28	3.18
Remainder (Error)	35	109.1		1,738		*900*	4		
Total	47								



PART V

EVALUATION OF VARIETIES OF SUGAR BEETS SUITABLE FOR THE GREAT LAKES REGION

with emphasis on

Black Root and Leaf Spot Resistance

Dewey Stewart

H. W. Bockstahler

G. J. Hogaboam

G. E. Coe

C. L. Schneider

H. L. Bissonnette

J. O. Gaskill

Farmers and Manufacturers Beet Sugar Association Great Western Sugar Company American Crystal Sugar Company 1 - 24

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New Company Sugar Association Sugar Sugar Company

Evaluation of US 400 and Other Varieties of Sugar Beets Resistant to Leaf Spot and Black Root

Introduction

by Dewey Stewart

Agronomic evaluation tests were conducted in 1956 with US 400 and other varieties of sugar beets that are resistant to leaf spot and black root. Tests were conducted in the states of Michigan, Ohio, Minnesota, Nebraska, and Colorado, and in Ontario, Canada. Members of the Sugar Crops staff who conducted the tests are H. W. Bockstahler and G. J. Hogaboam in Michigan; H. L. Bissonnette in Minnesota, and J. O. Gaskill in Colorado. The Cooperators in research organizations of the industry who conducted tests are P. A. Reeve, Farmers and Manufacturers Beet Sugar Association (tests at Sebewaing, Saginaw, Croswell, and Merrill, Mich., and Old Fort and Ottawa, Ohio); G. E. Nichol, Monitor Sugar Division (test at Auburn, Mich.); H. E. Brewbaker and H. L. Bush, Great Western Sugar Company (tests at Fremont and Findlay, Ohio, Longmont and Fort Morgan, Colo., and Gering, Nebr.); R. E. Finkner, American Crystal Sugar Company (tests at Hollandale, Minn., Rocky Ford, Colo., and Grand Island, Nebr.); and J. M. Cass, Canada and Dominion Sugar Company (test at Wallaceburg, Ontario). The description of the varieties included in these tests is given on page 66a.

Leaf spot is reported to have developed late in the season in the tests at Sebewaing, Mich., Hollandale, Minn., Wallaceburg, Ontario, Fremont and Findlay, Ohio. In the other tests conducted in the humid area, leaf spot was a negligible factor in the growth of the plants. In the irrigated area, leaf spot readings are reported for tests at Fort Collins and Longmont, Colo., but for the other tests conducted under irrigation the disease was of minor importance. In the test at Rocky Ford, Colo., it is estimated that 10 percent of the plants were infected with the curly top virus.

From reports of the investigators and from the performances of the susceptible variety, Synthetic Check (European), it is evident that black root was present in all tests conducted in the humid region, with the possible exception of those at Saginaw, Croswell, and Auburn, Michigan.

The results of 13 tests conducted in the humid region have been summarized in Tables 1, 2, and 3.

The outstanding average performance in the humid area was given by Accession 2066 (West Coast 5214), an increase of Breeder Seed SP 5481-0. This Breeder Seed was obtained through mass selections made in 12 progenies of SP 53AB1- (polycross) which were outstanding in leaf spot resistance and above US 400 in sucrose percentage. It will be noted from the summary tables that, as an average, Accession 2066 was only slightly higher in sucrose percentage than US 400, and its best performance was in acre yield of roots.

The performances of the two monogerm hybrids which were obtained by using US 400 as pollinator are especially interesting. Accession 1367, which was obtained by using US 400 as pollinator with SLC 34.176H₆, a male-sterile monogerm, performed well in some of the tests. However, further tests should be conducted with this hybrid under severe exposure to leaf spot and to black root before it is considered for commercial use in the humid area.

In tests conducted in the irrigated area, varieties developed by the sugar companies for their territories have given excellent performances, as shown by individual tests reported on pages 96-106. The results of these tests indicate that US 400 and relatives, which were developed especially for the humid region where both black root and leaf spot are hazards in sugar beet production, are not equally suitable for use in the irrigated areas.

For evaluation tests with related varieties, see Part VI.

1.0% the two managers include will rest obtained up caing are agentify interesting measured 126; which are sepected by interesting a male-effection with 200 in 1666, a male-effection performed well in acre of the relies. However, implies toods a conducted with the constitution of the constitution of the constitution in the hundred by constitutions in the hundred section of the constitution of the constitutions.

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Description of Varieties in Agronomic Evaluation Tests
1956

Summaries and reports of individual tests with these varieties are given on pages 67-110 of this report.

	Seed No.	Description
1.	Acc. 2057	US 401; leaf spot and black root resistant (WC 5354, increase of SP 53AB3-0 which stems from the same Breeder Seed, 50B3-0 as US 400)
2.	Acc. 2058	Hybrid variety; US 401 as pollinator (WC 5301, hybrid production of US 225 MS X US 401)
3.	Acc. 2064	Leaf spot and black root resistant (WC 5212, increase of SP 5480-0. Breeding for resistance to both leaf spot and black root)
4.	Acc. 2066	Leaf spot and black root resistant (WC 5214, increase of SP 5481-0. Broeding for resistance to both leaf spot and black root)
5.	Acc. 1367	Monogerm hybrid; US 400 as pollinator (WC 5331male sterile monogerm, SLC 34.176H16, X US 400)
6.	Acc. 1368	Monogerm hybrid; US 400 as pollinator (WC 5351male sterile monogerm, SLC 610 X 91 MS, X US 400)
7.	Acc. 1327	Synthetic check (WC 3216, increase of 486-0. Originally from a pool of 9 European brands)
8.	Local	To be supplied by the cooperator For tests conducted by F. & M., US 400 is suggested as "Local" and will be supplied as Acc. 2056 (WC 4441)

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seeds this stand tout within to stronger that ... ream of the or a set of the contract seed to the first one of the contract seeds and the contract of the con

US (U); lond equb and black root recisions; (We jose, increase of SP 50xB3-0 which at at an except form the same brancher lead, 50B3-0, at 15 (OO)	Ace 2057
Agreed variably US 40% er collinator (We 5701, avarid production of US 225 MS X US 401	
Leaf spot and black coot resistant (WE SELE, increase of DP SASO-D. Reseiler for remissance to book leaf apon and black coot)	Λαο. 20όφ
Leaf spot and alack root resistent (Wd 1214, increase dd S' 3681-0. brouding for wordsmance to root leaf spot and biots root)	Age. 2066
changers hybrid; 05 400 se polikeator (NC 5331-mair mostile nomogera, Sid 54,176816, X d6 400)	
Monogerm Inductify to 100 as collinator (NC 5351male sterlie monogers, sin 5351-510 to 100)	
Synthetic check (WC 3016, increase of 636-0. Originally	

no supplied by the compension of 100 is for tests and series by f. & M., US 100 is an access of loose and will be expelied

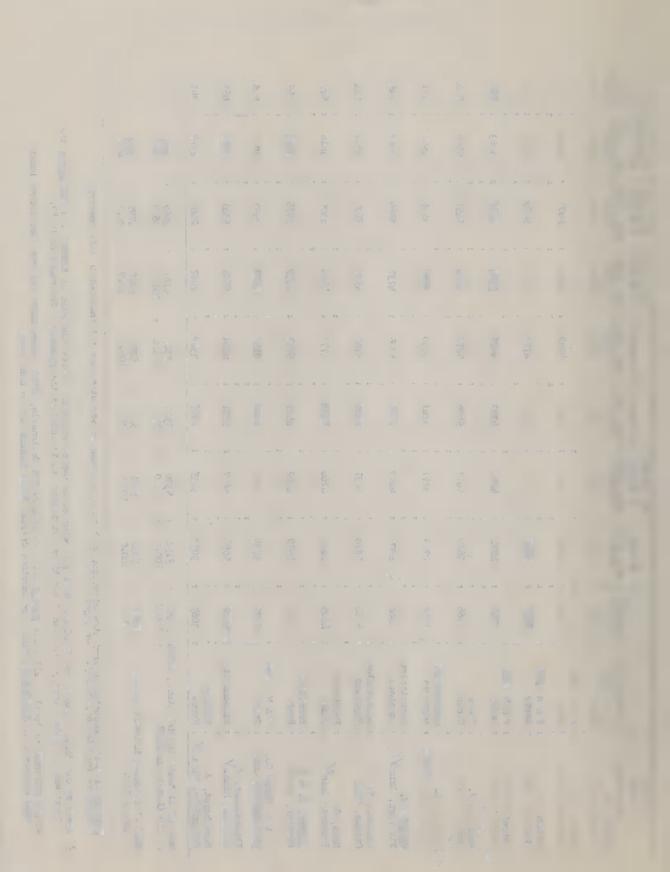
Grower	and bottoned	1,00013	US hot	** ** *	US 225 MS : X US 401 :	SP 5480-0 :		Monogerm :	Monogerm :	European Syn. Ch.	LSD
D. G.	F & M BSA	Founds 8051	Found:	00 00	Founds 8998	Pounds 8173	Pennas RKK3	Pounds RELA	Pounds :	Acc. 127	1921
Rader, E.	F & M BSA	2117		90 90	0 0				9		7
Gordon, R.	F & M BSA		0017		0707	0247	4039	176177		9987	
Croswell, Mich		. 5266	78677	** **	5151	5178	4792	5329	2099	5568	345
Nerrill, Mich.	Reeve BSA	3746	: 4274	** ** **	1,262 ::	4383	4525	3587	3658	3463	064
Wegener, F. Auburn, Mich.	Reeve	5568	5629		5407	5498	5279	5309	5451	9955	N. S.
Upright, D. Potterville, Mich.	Bockstahler Hogaboam	2942	2929	0 00 00 0	3297	3241	3030	3209	3435	3501	331
Watson, M. Old Fort, Obio2/	Bockstahler Hogaboam	: 14.88	7700		1679	5056	5305	4737	3966	2867	736
Pierman, R. Ottawa, Ohio	* Bockstahler * Hogaboam	5786	5878		1609	2965	5762	5538	5507	10911	TTIN
Haas, G. Fremont, Ohio2/	Brewbaker Bush	4805	: 4636	10 90 00 0		44134	1777	92777	h309 ···	3614	527
Krause, E. & K.	: Brewbaker : Bush	901/11	6194		1402	4577	5011	. 4339	3976 :	3352	345
C. & D. Sugar Co. Wallaceburg, Ont.	F&M BSA	. 6877	6739		7583	יי ידיור	8147	7422	7557	6923	N.S.
Klinkharmer, V. Stewart, Minn. 3/	: Bissomette	5482	: 5691		5697	5922	6261	5504	5347	3816	663
Ravenhorst, J. Hollandale, Winn.3/	Finkner Farus	3063	3030		3435	2985	3329	2882	20405	2379	243
Mean of 11 tests in Mich., Ohio, Ont. US 400 (Local) as 100%	fich., Obio, Ont.	5126	: 5158	00 00	5330 :	5303 :	5384 :	5181	4962 : 96.8 :	4695 91.6	The second secon
Mean of 13 tests in humid region US 401 as 100%		: 4995	5036	00 00	5212 :	5173 :	5293	5029 :	4795 : 95.2	88.3	
1/ Results of tests conducted in immissied districts with the	conducted in im-	pated dis	stricte with	th the	Contract Contract	OF SPECIAL CARE					

Summary Table 1. --Acre-yield of gross sugar in agronomic tests conducted in the Great Lakes area in 1956 to evaluate US 400 and related varieties of sugar beets developed for the humid region. I Data are given as 8-plot averages, except as noted. I

Regults of tests conducted in irrigated districts with the same group of varieties are not included in this summary. They are reported separately. See pages 96 to 100.

Tests at Old Fort, Fremont, and Findlay, Ohio, are reported as 6-plot averages. Tests conducted at Fremont and Findlay by the Great Western Sugar Company contained 3 additional varieties not included in the summary. See pages 86 to 89. 3

^{3/} US 400 *** used as local in all tests except those at Stewart and Hollandale, Minn., where Amer. 3-S was included as local. Test conducted at Hollandale, Minn., by American Grystal Sugar Company was on muck soil.



cted in the Great Lakes area in	s of sugar beets developed for,	s averages, except as noted.2/
in agromomic tests conduc	400 and related varieties	Data are given as 8-plot
Summary Table 2 Acre-yield of roots	. 1956 to evaluate US	the humid region.1

Tons Tons <th< th=""><th>Reported by</th><th>Local3/</th><th>US 401</th><th>US 225 MS X US LOI Acc. 2058</th><th>SP 5480-0</th><th>SP 5481-0:</th><th>Monogerm: X US 400:</th><th>Monogerm: X US 400:</th><th>European Syn. Ch.</th><th>. LSD .</th></th<>	Reported by	Local3/	US 401	US 225 MS X US LOI Acc. 2058	SP 5480-0	SP 5481-0:	Monogerm: X US 400:	Monogerm: X US 400:	European Syn. Ch.	. LSD .
11.8u 12.79 12.81 12.92 11.41 13.6u 13.43 13.36 12.35 13.55 12.73 13.77 12.47 12.79 12.96 10.0u 10.39 9.91 14.66 15.02 14.39 14.18 14.3h 14.65 14.07 15.23 15.17 13.8h 11.48 6.9h 15.46 14.23 17.1h 16.1h 15.7h 13.53 15.46 14.23 15.36 14.30 13.83 12.89 15.46 14.23 15.25 13.50 13.83 12.89 14.00 14.42 15.25 13.50 13.83 12.89 17.46 19.00 19.09 16.78 16.09 12.10 17.46 19.00 15.37 13.75 11.51 12.51	Tons 20.71	00 00 .0	Tons :	Tons 23.35	Tons 21.05	Tons 22.51	Tons :	Tons 18.85	Tons 20.18	Tons 1.48
13-45 13-36 12-35 13-55 12-73 13-77 12-47 12-79 12-98 10.04 10-39 9-91 14,-68 15,02 14,39 14,18 14,05 9,83 14,07 15-23 15,17 15,84 11,14 9.89 9.71 9.89 15,46 14,23 17,14 16,14 15,74 13.53 12.89 14,00 14,42 15,25 13,50 12,80 11,12 20,33 20,16 21,45 19,09 16,78 16,09 12,10 15,53 14,46 15,37 13,75 11,51 12,51 12,51	12.90		12.17	11.84	12.79	13.81	12.92	л. П.	13.64	: 0.74
12.47	13.51		13.02	13.43	13.36	12.35	13.55	12.73	13.77	: 0.91
14,-68 15,02 14,39 14,18 14,34 14,65 14,66 14,00 14,00 14,00 10,00	00.11		12.49	12.47	12.79	12.98	10.04	10.39	9.91	1.32
14.07 15.23 15.17 13.8h 11.4k 6.9h 13.53 15.4k 11.00 14.00 14.00 19.09 19.04 11.5t 1	15.12		15.03	14.68	15.02	14.39	14.18	14.34	14.65	S.
18.02 17.31 15.17 16.14 15.74 13.89 13.89 12.89 15.46 14.00 14.42 15.25 13.50 12.80 11.12 17.46 19.00 19.09 16.78 13.75 11.51 12.51 12.51 15.53 12.80 12.40	8 8 8 8		8.91	. 22.6	9.63	8.82	9.29	. I. I.	9.83	S. S.
18.02 17.31 17.14 16.14 15.74 13.53 15.46 14.23 15.36 14.30 13.83 12.89 14.00 14.42 15.25 13.50 12.80 11.12 20.33 20.16 21.45 19.64 20.01 18.61 17.46 19.00 19.09 16.78 16.09 12.10 15.53 13.75 11.51 12.51	13.41		. ०१.५८	14.07	15.23	15.17	13.84	11.48	8.94	1.99
15.46 14.23 15.36 14.30 13.83 12.89 12.89 14.00 14.00 14.45 19.64 10.64 12.00 12.10 17.46 19.00 19.09 16.78 13.75 11.51 12.51	17.06		17.08	18.02	17.31	17.14	16.14	15.74	13.53	1.25
20.33 20.16 21.45 19.64 20.01 18.61 17.46 19.00 19.09 16.78 13.75 11.51 12.51	15. L8		15.32	15.46	74.23	15,36	14.30	13.83	12.89	1.63
20.33 : 20.16 : 21.45 : 19.64 : 20.01 : 18.61 : 17.46 : 19.00 : 19.09 : 16.78 : 16.09 : 12.10 : 15.53 : 11.42 : 15.37 : 13.75 : 11.51 : 12.51 :	13.96 ::		14.59	17,000	24.45	15.25	13.50	12.80	11.12	0.93
17.46 : 19.00 : 19.09 : 16.78 : 16.09 : 12.10 : 15.53 : 15.53 : 15.37 : 13.75 : 11.51 : 12.51 :	18.48		18.33	20.33	20.16	21.45	19.61	20.07	18.61	S. S.
15.53 : 15.37 : 13.75 : 11.51 : 12.51 :	16.57		17.60	17.46	19,00	19,09	16.78	16.09	12.10	2.02
	13.80		14.32	15.53	24.42	15.37	13.75	11.51	12.51	0.98

^{13.37} 13.21 Results of tests conducted in irrigated districts with the same group of Varieties are not included in this summary. They are reported separately. See pages 96 to 100. 13.75 14.48 14.60 15.20 15.51 15.09 15.34 15.42 15.22 101.01 100.00 ** *! 14.68 100.00 Wean of 11 tests in Mich., Obio, Ont. : Mean of 13 tests in humid region US 401 as 100%

Tests at Old Fort, Fremont, and Findlay, Ohio, are reported as 6-plot averages. Tests conducted at Fremont and Findlay by the Great Western Sugar Company contained 3 additional varieties not included in the summary. See pages 86 to 89. NI.

^{2/} US 400 was used as local in all tests except those at Stewart and Hollandale, Minn., where Amer. 3-5 was included as local. Test conducted at Bollandale, Minn., by American Crystal Sugar Company was on muck soil.

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		2						7			
i di	* 3			8							** 60 %
					the contract of		THE SOLL STREET				

Summery Table 3. --Sucrose percentages in agronomic tests conducted in the Great Lakes area in 1956 to evaluate U. 400 and related variations of sugar beets developed for the Mumid region. Results are given as 8-10t averages except as noted.

Grower and Location	Reported by	Local 3/	: US 401	. X UE 401 Acc. 2058	SP 5480-0 Acc. 2064	SP 5481-0 Acc. 2066	Monogerm X US 400: Acc. 1367:	Monogerm : X US 400 : Acc. 1368 :	European Syn. Ch. Acc. 1327	. LDS odds 19:1
Gremel, H. Sebewaing, Mich.	Reeve, P.A.	19.47		19.12	19.44	19.04	19.55	20.31	18.18	80.0
Rader, E. Saginsw, Mich.	F & M BSA Reeve	17.27	17.19	17.10	17.30	17.09	17.41	17.51	17.86	0.45
Gordon, R. Groswell, Mich.	F & M BSA	19.46	19.22	. 19.19	19.38	19.44	19.68	20.03	20.02	: 0.34
Detroit Stake Merrill, Mich.	Reeve Reeve	16.99	17.14	17.09	17.14	17.53	7.25	17.57	17.54	w. W.
Wegener, F. Auburn, Mich.	Reeve	18.44	18.71	18.41	18.31	18.33	18.73	18,99	18.99	0.50
Upright, D. Potterville, Mich.	Bockstahler Hogaboam	16.65	.: 16.41	16.84	16.79	10.71	17.22	17.64	17.70	24·0:
Watson, M. Old Fort, Chio2/	Bockstahler Hogaboam	16.74	17.01	16.55	16.62	17.50	17.11	17.20	15.95	99.0
Pierman, R. Ottawa, Ohio	Bockstahler Hogaboam	17.00	17.21	16.88	17.22	16.80	17.14	17.49	16.95	24.0
Haas, G. Premont, Obio-2/	Brewbaker Bush	15.52	15.13	35.45	15.58	15.55	15.65	15.58	14.02	ής·0:
Krause, E. & K/ Findlay, Ohio-	Bush Bush	15.78	: 15.83	15.72	15.87	16.43	16.07	15.53	15.07	69.0
C. & D. Sugar Co. Wallaceburg, Ont.	F & M BSA	18.64	18.38	18.68	18.41	19.00	18.89	18.90	18.61	
Klinkhammer, $V_3/$ Stewart, Minn. $\frac{3}{2}/$. Bissonnette	16.56	: 16.19	16.34	15.75	16.41	16.43	16.65	15.94	95.0 ::
Ravenhorst, J. Hollandale, Minn.3/	Finkner	11.10	10.58	11.06	10.35	10.83	10.48	10.45	9.51	0.55
Mean of 11 tests in Mich., Ohio, Ont. US 400 (Local) as 100%	ch., Ohio, Ont.	17.45	: 17.40	17.37	17.46	17.61	17.70 :	17.89 :	17.37	** **
Mean of 13 tests in humid region		: 16.89	: 16.78	16.80	16.78	17.00	17.05 :	17.22 :: 102.6 ::	16.66	

group of varieties are not included in this summary Results of tests conducted in irrigated districts with the same They are reported separately. See pages 96 to 100. Tests at Old Fort, Fremont, and Findlay, Ohio, are reported as 6-plot averages. Tests conducted at Fremont and Findlay by the Great Western Sugar Company contained 3 additional varieties not included in the summary. See pages 86 to 89. NI

US 400 was used as local in all tests except those at Stewart and Hollandale, Minn., where Amer. 3-S was included as local. Test conducted at Hollandale, Minn., by American Crystal Sugar Company was on muck soil. 3

SUGAR BEET VARIETY EVALUATION TEST - 1956

Conducted by P. A. Reevo, Mark Berrett

at Sebewaing, Michigan

Herold Gremel
(include name of farmer)

Cooperations F. &. M. , & Harold Gremel, farmer

"xparimental Design: 8 x 8 Latin Square, Dosign / 2.

lot Size: No. of rows - 4 rows

row width - 28 inches row length - 50 feet

Planted: Rim April 23

Harvested: October 27

Rove Harvested: 2 center, hand hervested Net Bow Length Harvested: 48 feet

May were samples for sucrose determinations takens

2- 10 boot sumples from top ed piles

How was stand determined:

Harvested boets counted when weighed.

Whon:

Fleld History: 1955- Beans, 350# 5-20-20

1954- Pasture, manured for beans.

1953- Hay.

Fertilization of this best crop: 800% 5-20-20 beneath seed, 150% 10-10-10 with seed 45% N sidedressed in July.

Leaf spot exposure:

Comments on black root or other diseases:

Hone

Soil and seasonal conditions: Seedbod- moist. Rein adequate.

Tour comment on reliability of test:

Excellent.

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Comment to own about 1

. d. M. , & Marel: Grenol, Carron

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1956- Bapes, 250; 5-20-20 1959- Backure, chaused for which 1952- Nov.

Less die die Olett will geen armore 13-18-1 1005 per bood atilt

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Merold Gremel Sebewaing, Michigan

(Results given as 8 plot averages)

	*	Acre	Yield	:	0
	ntry : S.P. vari	•		Sucrose Percent	Plants per 100' of row Number
	1 : Acc. 2057 2 : Acc. 2053 3 : Acc. 2064 4 : Acc. 2066 5 : Acc. 1367 6 : Acc. 1368 7 : Acc. 1327 0 : Local	8,928 6,173 9,523 8,546 7,613	20.84 23.35 21.05 22.51 21.90 12.85 20.13	: 19.12 : 19.44 : 19.04 : 19.55 : 20.31 : 18.18	96 98 101 99 106 105 99
	General Lean	: 8,144	: 21.17	19.28	: 101
-	S.E. Variety Mean S.E. Variety es % of General lean	:	0.52	0.29	3
· continue .	liff. req. for 31 (Odds ly:1)	8.	1.40		: N.S.

Variance Table

Complete or processing where well and our residence where the process of the control of the cont	1	1	Mean	Squares	to confirmment or an administration of the Associated
	:	: Fross	*	Section of the s	The second secon
Source of variation	: D/F	: Sugar	: Roots	: Sucrose	: Plants per
	:	: (l.bs)	: (tons)	: (¢)	: 100' of row
Between columns	: 7	: 275,299	3.4753	: 1.30	: 312
Between rows	: 7	: 527,139	: 4.5916	: 1.49	: 146
Between varieties	1 7	:2,226,951	: 15.7379	: 2.87	: 109
Remainder-Error	: 42	: 175,270	1 2.1/1.2	: 0.67	: 66
Total	1 63	•	•	•	Address: Address: C. St. C. Sp. C. St. Sp. C. St. Sp. C. St. Sp. C. Sp
Calculated F. value b	/:	1 12.63**	1 7.311**	: 4.28**	1.65 M.S.

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

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105 104 104 105 105 105 105 105 105 105 105 105 105			01.05 02.01 02.01 04.01 04.01 04.01		171.0 6.00.3 6.00.3 7.6.7 6.00.3 6.00.3		Acc. 2050 Acc. 2050 Acc. 2060 Acc. 2060 Acc. 1767 Acc. 1568	
	V3.0	3		8				
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3417 : 0,1 :	55.2 51.1 : 20 52.1 : 20	65 1 . 1006 940 8	
	** S. M **.	12.5 3 443.5.51	

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SUGAR BEET VARIUTY HVALUATION TEST - 19 56

Conducted by P. A. Roove, Mark Berrett

at Seginaw, Michigan

Elmer Rader (include name of farmer)

Cooperation: F. ... Elmoi

Experimental Design: 0 x 8 Latin square, Design # 5.
12 x 8 Random block. Design # 28.

Plot Sizo: No. of raws - 4 rows
row width - 28 inches
row length - 50 feet

Planted: June 7

Harvested: 8 x 8 - October 10 12 x 8 - October 16

Rows Harvested; 2 center-hand harvested Net Row Length Harvested; 48 feet

How were samples for sucrose determinations taken:

How was stand determined:

Harvested beets counted when weighed.

When

1955- Alfalfa, plowed down
1954- Oats, seeded, 300# 5-20-20
1953- Beets, 300 # 0-20-20

Fortilization of this best crops 500# 5-20-20

Legi spot exposure: None

Comments on black root of other diseases;

None

Soil and seasonal conditions: Seodbed- dry.

Your commont on reliability of test:

Both tests- excellent.

CI - TEAT HOLFSDIATI INTING I HE IN

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1966- Alfelfa olimed journ 1966- Date scoon, 800% 5-20-80 1988- 300ma 500 6-20-20

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Acres conditions, Succession des.

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the lanes about Admi

Ther Rader Sadinaw, Michigan

(hemilts given as 8 plot averages)

	: Acre	Ylela -	manifer or secure security on days pro-	and the second second second second
Entry: S.P. variety No.: and local	Gross Sugar Founds	Roots Tons	Sucrose	Plants per 100' of row Jumber
1 : Acc. 2057 2 : Acc. 2056 3 : Acc. 2064 4 : Acc. 2066 5 : Acc. 1367 6 : Acc. 1368 7 : Acc. 1327 8 : Local	: 4,007	12.17 11.64 12.79 11.81 12.92 11.41 13.64 12.90	: 17.19 : 17.10 : 17.30 : 17.09 : 17.41 : 17.51 : 17.86 : 17.27	89 93 97 95 100 97 96
deneralean	· +,313	12.43	: 17.34	96
S.E. Variety mean	97	0.26	0.15	3
of General .can Diff. rec. for Sig.	: 2.25	2.09	: 0.86	2.61
(Odds 19:1)	: 277	0.74	: 0.42	M.S.

Variance Table

		:	ean Souares					
:		: Gross	• · · · · · · · · · · · · · · · · · · ·	The second secon	The state of the s			
source of variation :	D/F	: Suger	: Roots	Sucrose :	Plants per			
:		: (1bs)	: (tons) :	(%) :	100' of row			
Between columns :	7	: 571,773	: 5.7171	1.70 :	541			
Between rows :	7	: 70,820	: 1.2180 :	: 3.04 :	53			
Between varieties :	7	: 714,578	: 4.4270 :	0.52	99			
Remainder-Error :	41	: 75,220	: 0.5411 :	0.18	51			
Total :	65	1	1	:	and affirmed to the same			
Calculated F. value b/:		: 9.50**	: 5,18**	2.96* :	1.94N.S.			
				distribution — LV A I I I I I I I I I I I I I I I I I I	and the second second second second			

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

Section of the section

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					AGC. 2057	
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			3 g - 100 g		Nec. 1367	
					1381 . DOA	
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ale F. Liver at F-percent Level with " and 1-percent

SUGAR BEET VARIETY EVALUATION TEST - 1956

Conducted by P. A. Reeve, Mark Berrett

at Croswell, Michigan

Reed Gordon
(include name of farmer)

Coopsision: . & M. Reed Gordon, farmor.

Experimental Design: 8 x 8 Latin Square, Design # 6.

Plot Sine: No. of rows - 4 rows

row width = 28 inches row longth = 50 feet

Flanted: June 8

Harvested: October 30

Nows Harvestod: 2 center, hand harvested Mat Law Langth Harvonted: 48 feet

How were samples for snorose determinations teleant

2- 10 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed.

When:

Meld History: 1955- Hay, top-dressed with manure.

1954- same

1953- Wheat, 300/ 3-18-9 200/ 10-10-10

Fortlization of this best crops 400# 5-20-10 broadcast, out --- with seed.

Lest opet exposite:

lone

Community on black root or other Classical

Hone

Soil and seasonal conditions: Seedbad- mois

Your comment on reliability of wasta

Excellent

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PERSONAL PROPERTY AND ADDRESS OF THE PERSON NAMED AND ADDRESS

The second district

Wall Dock

Reed Gordon Croswell, Michigan

(Results given as 5 plot averages)

all a develop a filtride. Prink service, should reliable a discharge following effective and self-service.	Acre	Yield	e i tir i ur in nest i i i amunto i un risido promisensus	to a solve reliable consequence to describe the described to the solution of t
Entry : S.P. variety No. : and local :	Gross Sugar Pounds	Roots	Sucrose	Plants per 100' of row Mumber
1	4,984 5,151 5,178 4,792 5,329 5,099 5,548 5,266	13.02 13.43 13.36 12.35 13.55 12.73 13.77	: 19.22 19.19 19.38 : 19.44 : 19.68 : 20.03 20.24 19.46	79 77 84 78 90 86 83
General Mean	5,171	13.22	19.58	83
S.E. Variety Mean S.E. Variety as % of General Mean	121 2.34	0.32	0.12	3.37
Diff. req. for Sig. (Odds 19:1)	345	0.91	0.34	8

Variance Sable

Company of a designation of the second section of the section	;	Mean Squares						The specific control of the specific solutions and the specific solutions and the specific solutions are specific solutions.		
	8			Gross	-		-	nga tamantan manang kali tenggan bagian sa masa sa sa sa	:	Promouvelettings openium in agreement augmentum openium of the state o
source of variation	1	D/F		Sugar	*	Roots	No.	Sucrose	1	Plants per
			:	(lbs)	1	(tons)	8	(%)	:	100 of row
Between columns	8	7	1	347,272	:	2.9148	:	0.94	1	64
Between rows	;	7	9	762,523	1	6.2013	*	0.89	- 1	215
Between varieties	0	7	8 0	429,177	2	1.8561	1	1.16	£	192
Remainder-Error	1	c/	9	116,695	0	0.8093	1	0.12	*	63
lotal	8	c/	*	The same of the sa		er me a vergener i	Tayl streets	the same of the sa	e a comp	interestables considerad portropassimon debuggionists con
Calculated F. value by	1:		1	3.68**	0	2.29*	B B	9.99**	\$	3.05*

- b/ Designate F. values at 5-percent level with *, and 1-percent level with **.
- c/ Due to issing plot calculations the following table of D/F should be used:

:1						: beets/100'
error :	41	0 0	77) r on in in	42	: 41
remainder:	62		152	# H	.63	62

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		(255)	

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IGAT BEET FARITITY TVALHATION THAT - 1956

Canducted by P. A. Reeve, Mark Berrett

at Merrill, ichigan

Detroit Stake Farm
(include name of farmer)

U moration: F. & M., Detroi Stake Farm

porimontal Docigo: 8 x 8 L - quare, . . imn / 3

Flat Size: No. of rows - 4 rows

row width = 28 inches
row length = 50 feet

Planted: May 19

Harvesteds October 12

Rows Harvested: 2 center, hand harvested Net Row Leagth Hervested: 48 feet

How were samples for sucrese determinations taken:

2- 10 beet samples from topped piles.

How was stand determined:

Harvested beets counted when weighed

When:

Field History: 1955- Corn, 500 4 0-20-20

1954- Alfalfa

1953- Barley, soeded, 250# 5-20-20

Partilization of this best crops

500# 5-20-10 beneath seed.

Leg. I spot exposures

Mone

Comments on black root or other diseases

None

Soil and seasonal conditions: Seedbed- moist.

Your comment on reliability of test:

Fair.

LOS - THE COMMITTEE CO. T. A. P. C.

Control out Control of The Party

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no 92 - William P. Sept.

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States - house wife the state of the state of

Letroit Stake Farm Merrill, Michigan

(Results given as 8 plot averages)

-	apartonic of manipulation are an discount of the desired transformer territories. It shall be a first	: Acre I	lield	S d	for a city of propagation and the same of
Entry No.	S.P. variety and local	Gross Sugar Pounds	Roots Tons	Sucrose Percent	Plants per 100' of row Number
1 2 3 4 5 6 7	Acc. 2057 Acc. 2058 Acc. 2064 Acc. 2066 Acc. 1367 Acc. 1368 Acc. 1327 Local	1 4,383 1 4,525 1 3,587 1 3,658 2 3,463	12.49 12.47 12.79 12.98 10.04 10.39 9.91 11.00	17.14 17.09 17.14 17.53 17.25 17.57 17.54 16.99	81 90 94 85 91 85 86 79
Genera	al Hean	3,987	11.55	: 17.28	87
	Variety Hean	172	0.45	0.17	3
of 0	deneralean req. for Sig.	4.31	4.00	0.98	3.98
	is 19:1)	: 490	1.32	N.S.	N.S.

Variance Table

Resident Street can accommission for the a per designation of the entry to the entr	ourrauge. Was dem in	Mean Squares							
1		: Gross	0	of a common summary su	0	Commission of the Commission o			
Source of variation :	D/F	: Sugar	Roots	Sucrose	1	Plants per			
1		: (lbs) :	(tons):	(%)	*	1001 of row			
Between columns :	7	:1,557,065		1.45	:	574			
Between rows :	7	: 998,619 :	9.2214	0.92	*	150			
Between varieties :	7	:1,378,767 1	12.5447 :	0.42	1	189			
Remainder-E.ror :	c/	: 235,907 :	1.7079	0.23	:	97			
Total	c/	*	0		Magazina and P o	Security Commission (Control of Control of C			
Calculated F. valueb/:		: 5.84**	7.35** :	1.3KN.S.	:	1.95A.S.			

- b/ Designate F. values at 5-percent level with *, and 1-percent level with **.
- c/ Due to missing plot calculations the following table of D/F should be used:

:1bs sucrose/acre: tons roots/acre: % sucrose | beets/100 |
error : 39 : 41 : 41
remainder: 60 : 62 : 62

(Roundes stated on party as burell)

	1		
	THE SE I		. 2.288
	1 87.83	505, 4 :	
27.53	6 38.96	525.4	
	12.6		
	: 12.00		
		1 5.967	
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JUGAR BEET VARIETY EVALUATION TEST - 19 56

Conducted by P.A. Roeve, Mark Berrett, Grant Michol

at Auburn, Michigan

Fred Wegener
(include name of farmer)

Committee Feld Me, Monitor Sugar Div., Fred Wogener, farmer

Profession 1 Design # 4.

12 x 8 Candom Block, Design # 27.

Plat Simo: Mo. of rows - 4 rows

row width - 28 inches

row longth - 50 feet

Planted: May 22

Harvosted: 8 x 8-- October 15 12 x 8-- October 16

How Harvested: 2 center, hand harvested Net Row Length Harvested 48 feet

How were samples for sucrese determinations taken:

2- 10 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed.

When:

Reld History: 1955- Beans 125# 3-12-12 1954- Beans, 125# 3-12-12 1953- Clover, plowed down

Fertilization of this best crops 300# 3-12-12 broadcast 300# 4-16-16 at planting

Leaf spot exposures Fone

Comments on black root or other diseases:

None

Soil and seasonal conditions; Seedbod- wet

Your commont on reliability of test:

8x8 -- good 12 x 8-- fair. TRISTAR TO BE IN TOTICE

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You -badham? sumple Mana

soned to the co

see fair.

Fred Wegener Auburn, Michigan

(Results given as 8 plot averages)

	Acre	Yield		ormalinadori refermentos : sucesado remát filodos - en mes P B
Entry : S.P. variety : No. : and local :	Gross Sugar Pounds	Reots	Sucrose	Plants per 100° of row Number
5 Acc. 1367 : Acc. 1368 :	5,407 5,498 5,279 5,309 5,451 5,566	14.68 15.02 14.39 14.18 14.34 14.65	18.71 18.41 18.31 18.33 18.73 18.73 18.99 18.99	88 83 84 69 73 78 84 82
General Mean	5.463	14.68	18.61	80
S.E. Variety Hean S.E. Variety as %	179	0.45	0.18	3
of General Mean Diff. req. for Sig.	3.28	3.10	0.94	3.623.42
	M.S.	. w.S.	0.50	8

Variance Table

0	: Hean Squares					
*	:	(fross ;	9		1	
source of variation :	D/F :	Sugar :	Roots :	Sucrose	: Plants per	
:	:	(1bs) :	(tons):	(%)	: 100' of row	
Between columns ;	7 :	1,040,554:	5.7444 8	0.34	: 554	
Between rows	7 :	504,690 :	4.8554	0.55	: 50,4	
Between varieties :	7	126,997:	0.9956 1	0.63	: 320	
Remainder-Error :	141 :	257,583 :	1.6567 8	0.25	E 60	
lotal :	62 1	LE LL 2 Assessions of Contractive and its effective to the Contractive and the Contrac	desperience and address of the second	from Anthony or technology of the contract of	5.23	
Calculated F. value b/:		0.49N.S.	0.60M.S.:	2.54*	: 478**	

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

r rong on covin allowed!

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			14 Acc. 2086
		1	

C. FUSL. 8.1		ied 2. value W:
. * 113 FW (

SUGAR BEET VARIETY EVALUATION TEST - 1956

Conducted by M. . . Bockstahler, G. J. Homaboam

at Pottorville, Wichigan

lon Upright
(include name of farmer)

Cooperations USDA, Ion Upright, former

Experimental Design: 8 x 8 Latin Square, Design # 9.

Plot Sizes No. of rows - 4 rows

row width = 28 inches
row length = 88 feet

Plantod: May 29

Harvesteds October 10 & 11

Rows Harvested: 2 center.

Net Row Longth Harvested: 86 feet

How were samples for sucrose determinations taken:

2- 20 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed

Whens

Field History: 1955- Beans

1954- Oats, seeded to Mammoth clover. 350# 3-12-12

1953- Corn

Fortilization of this best crops

350# 5-20-20

Legit spot exposures

None

Comments on black root or other diseases;

Blackroot- moderate

Soil and seasonal conditions: Seedbed- moist. Dry season following planting.
Stand generally thin.

Your comment on reliability of tests

TOTAL MOTESTAY TRANSPORT BUILDING TOTAL

- -

Don Upright
Potterville, Achigan

(Results given as 8 plot averages)

Minister a programmy philipsoid	15 in distribution in 1 and 6 to 3 distribution and so 1 to 1 section 6 demonstrated and 6 distribution of 6 distributio	Acre	Yield	9	
Entry No.	S.P. variety and local	Gross Sugar Pounds	Roots	Sucrose Percent	Plants per 100' of row Number
1 2 3 4 5 6 7 8	Acc. 2057 Acc. 2058 Acc. 2064 Acc. 2066 Acc. 1367 Acc. 1368 Acc. 1327 Local	2,929 3,297 3,241 3,030 3,209 3,435 3,501 2,942	3.91 9.77 9.63 8.82 9.29 9.71 9.33 8.81	16.41 16.84 16.79 17.01 17.22 17.64 17.70 16.65	53 : 68 : 69 : 63 : 73 : 78 : 68
Genera	al Hean	3,198	9.35	17.03	: 66
	Variety ean	116	0.33	8 0.15	8 3
of G	eneral Hean req. for Sig.	3.63	3.53	0.87	4.82
	ds 19:1)	331 :	r.s.	. 0.42	9

Variance Table

published in an inferior of an inferior of the description of the desc		distribution of supplies of su		Squares	denotes to survivally to defining a plateage out out on republic deducation specimen and
Source of variation	D/F	: Gross : : Sugar : : (1bs) :	Roots (tons):	Sucrose	Plants per 100' of row
Between columns Between rows	7	: 450,710 :	2.6565 : 9.9338 :	0.58 3.79	: 184
Between varieties Remainder-Error	7	: 372,005 : : 107,696 :	1.5781 : 0.8721 :	1.70	: 510 : 81
Total Calculated F. valueb/	c/	: 3.45**	1.81N.S.:	9.60**	: 6.30**

- b/ Designate F. values at 5-percent level with*-, and 1-percent level with **.
- c/ Due to missing plot calculations the following cable of D/F should be used:

	: lbs	sucrose/	acre : t	ons roots/a	cre i d	sucrose	9 9	beets/1001
error	4 0	L.1	9	71	0 0	42	9	717
remainder	8	62	3 3	62	1	63	8	52

(negative Join & sa povi, stuesh)

: Flants : per 1000				B. variety 1
Eldmi :				
		8.91		
89 .			3,294	
	17.02	2 29.8		
			3,7	
22	17.03	1 85.8	1 861.5	
98, 1	T8.E			
		1 .0.14	EE.	

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			1 (0(1)		
	1 000		TOUT OFF		
		0.5721	107, 591		
	graphic in the Sales Sales				
4.30**	1 4408.6				
	The second second				

at 9-parcent of vicht, and 1-percent

when plot estent thoma was following value of 3/2

tuttleseen teausons ; : ease/especiales : eas /ease e a.

SUGAR BEET VARIETY EVALUATION THAT = 19 56

Conducted by H. h. Bockstahler, C. J. Hogaboam

at Old Fort, Ohio

Marshall Watson (include none of farmer)

. . . . F. & M., USDA, Tarshall Matson, farmer.

8 x 8 Latin Square, Design # 7. (Resuced to 8 x 6, 2 reps. dropped)

Pl: [1so; No. 02 rows - 4 rows

row width - 34 inches
row longth - 65 feet

Plantad: May 23

Harvested; October 25 & 26.

Pows Harvested: 2 center. Scott-Viner Net Row Length Hervested: 61 feet

low were samples for sucrose determinations takens

2- 10 beet samples from harvested piles.

How was stand determined?

liarvested beets counted when weighed.

Whone

Field History: 1955- Alfalfa

1954- Alfalfa

1953- Oats, seeded

1952- Beets

Tertilization of this best crops 200# Am. sulfate, 300# 0-20-20 plowed down, manured. 200# 3-12-12 in row

Leaf spot exposure:

None Comments on black root or other diseases:

Blackroot- light to moderate. Wireworms severe in two replications made it necessary to drop these two reps. from the experiment.

Seedbed- moist.

line comment on reliability of test:

Good .

Cld Fort, Chio

(Results given as & plot averages)

stantificad. Managimadin tempor city ()	: Acre	Yield	on the common of	27 - 147 - 7 St. de or Leben Begger-militario Lucius
Entry : S.P. variety No. : and local	Gross Sugar Pounds	Roots	Sucrose Percent	Plants per 100' of row Mumber
1 Acc. 2057 2 Acc. 2058 3 Acc. 2064 4 Acc. 2066 5 Acc. 1367 6 Acc. 1368 7 Acc. 1327 8 Local	4,679 5,056 5,305 4,737 3,966 2,667	14.40 14.07 15.23 15.17 13.84 11.16 3.94 13.41	: 17.01 : 16.55 : 15.62 : 17.50 : 17.11 : 17.20 : 15.95 : 15.74	86 77 81 83 88 69 53 82
General lean	4,499	13.32	16.83	77
S.E. Variety Mean S.E. Variety as %	255	0.69	0.21	7
of General Mean Diff. req. for Sig.	5.70	5.21	: 1.24	9.27
(Odds 19:1)	736	1.99	0.60	20

Variance Mable

traditional diago stratigique adago se l'obre e l'obresse e l'obresse d'org		**************************************	Mean	Squares	E to the contradict of desirable regarders a desirable administration.
Source of variation	: D/F	Gross Sugar (1bs)	Roots:	Sucrose	Plants per 100' of row
Between columns Between rows Between varieties Remainder-Error	: 5 : 7 : 35	: 348,973 : 3564,388 : 394,633	1.6511 : 27.1284 : 2.8930	0.79 1.37 0.26	298 757 305
Total Calculated F. value b/	: 47	: 9.03**	9.38**	5.23**	: 2.48*

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

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SUGAR DEET VARIETY EVALUATION TEST - 13.56

Conducted by H. . Boc'stahlor, C.J. Horabour

of Ottowa, Ohio

Ray Pierman

Cooperations F. & T., USIA, Ray Pierman, farmer

Experimental Desagn: 8 x 8 Latin Square, Lesien / 8.

Plot Simes No. of Town = 4 rors

row width - 28 inches, row longth = 62 feet

Plantod: May 25

Harvested; November 7

Rove Harvasted: 2 center, Merboet Jr. Het Dow Loroth Berrastede 58 feet

How were complet for custon: laboral retion: telaus

2- 10 beet samples 'rom 'arvested boots

How was stand determined;

Larvested boots counted in weighed.

Whons

1955- Corn Meld History:

1953- Beets

1952- Wheet, seeds - clover.

Fortilization of this book aropa

300-700# 10-10-1 are arm, 200# 5-13-13 with seet.

Leef spot emposites

Light.

Comments on black root or other discas

Soil and seasonal conditions; Soedan ary. Alequate rains before & after slanting.

Your comment on reliability of Beat.

Excellent.

THE - DEED WOLDSTING AND LAST NOOD

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Ray Pierman Ottawa, Ohio

(Results given as 8 plot averages)

Entry S.F. variety No. : and local	Gross Suger rounds	Yield Roots Tons	Sucrose Percent	Plants per 100' of row Mumber
1	5.878 6.091 5.962 5.762 5.538 5.507 4.604 5.786	17.08 18.02 17.31 17.14 16.14 15.74 13.53 17.06	: 17.21 16.88 : 17.22 16.80 17.14 17.49 : 16.95 17.00	74 76 78 68 72 73 65 74
General Mean S.E. Variety Mean	5.641	16.50	17.09 : 0.15	73
S.E. Variety as % of General Mean Diff. red. for Sig. (Odds 19:1)	2.74 1/41	2.45	0.87	14.0K

Variance Table

recognitionally a decays, good sillation resultance to the call a delegion see there is a	*	:						
Source of variation	: D/F	: Grose : Sugar : (1bs) :	Roots (tons)	Sucrose	Plants per 100' of row			
Between columns Between rows	: 7	:1,111,949 : :1,382,413 :	7.7535 9.9357	0.74	302 383			
Between varieties . Remainder-Error	: 42	:1,715,354 : 191,195 :	15.5253 1.5262	0.40 0.18	: 132 : 72			
Total Calculated F. value b/	: 63	: 8.97**:	10.17**	2.29*	: 1.83M.S			

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

(neground tol. If me perly ellused)

					gray shadon K.a	
sanela NOL Try						
			5,87%			
	14.35	1 13.53	TVS:			
44						
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		137.05			
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.E. M.S. A.					

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AGRONOMIC EVALUATION TEST

Conducted by: H. E. Brewbaker and H. L. Bush

Location: Glen Haas Farm, Fremont, Ohio

Cooperation: Northern Ohio Sugar Company

Date of Planting: April 21, 1956

Date of Harvest: September 25-26, 1956

Experimental Design: Triple Lattice. Sugar percentage and purity analyzed as

Randomized Complete Block since no efficiency was gained

thru lattice analysis for these characters.

Size of Plots: 6 rows x 23 feet planted (32 inch rows)

Harvested Area per Plot for Root Yield: 6 rows x 18 feet

Samples for Sucrose Determinations: 2 samples, each 1 row x 18 feet

Stand and Bolter Counts: Beets counted in laboratory for stand.

No bolters developed in this test.

Recent Field History: 1955 grass and clover pasture

Fertilization of Beet Crop: 250 lbs. per A. 12-12-12 side dressed at planting time

Leaf Spot Exposure: Moderate - fairly late in developing

Black Root Exposure: No seedling disease and very little mature rot

Curly Top Exposure: None noted

Other Diseases: None noted

Soil and Seasonal Conditions: Rains and cool weather not conducive to early

development but summer and fall were probably fairly

normal.

Some yellowing of tops when harvested.

TREET MORTALIANE DIMONORRA

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Cooperator: Northern Ohio Sugar Company by H. E. Brewbaker and H. L. Bush Year: 1956

Location: Glen Haas Farm, Fremont, Ohio

(Results given as 6 plot averages)

Variety and Description	Acre- Suga Recoverable (1bs	a Gross	Roots (Tons)	Sucrose (%)	Stand (No.)	Leaf (d _{Root} (e	Thin Juice App. Purity (%)
USDA Acc. 2066 US400 USDA Acc. 2058 US401 GW674-55R B740 (Mono) F54-10H (Mono) USDA Acc. 2064 USDA Acc. 1367 (Mono) USDA Acc. 1368 (Mono) USDA Synthetic Check	4099 4086 4078 3902 3895 3878 3876 3819 3797 3658 2865	4777 4805 4780 4636 4585 4523 4580 4434 4476 4309 3614	15.36 15.48 15.46 15.32 14.51 13.96 14.54 14.23 14.30 13.83 12.89	15.55 15.52 15.45 15.13 15.80 16.20 15.75 15.58 15.65 15.58	116 114 115 117 112 114 119 113 112 115 114	1.8 3.3 3.3 2.8 1.8 2.3 3.3 3.0 4.3 7.5	0.3 0.0 0.3 0.0 1.1 0.0 0.0 0.2 0.2 0.3 1.2	93.08 92.68 92.82 92.25 92.58 93.02 92.43 93.25 92.57 92.60 89.82
General Mean(f	3771	4443	14.35	15.48	114	2.9	0.3	92.58
S.E. Variety Mean " " as % of General Mean	-	175 3.93	0.53 3.73	.1931	gno this	cm cm	-	.4353 0.47
Diff. req. for Sig. (Odds 19:1)	447 (b	527	1.63	0.54	delley	See See	-	1.23

Variance Table

			Mean Squares								
Source of variation	D/F	Gross sugar (c	Roots	Sucrose	Thin Juice App. Purity						
		(lbs.)	(Tons)	(%)	(%)						
Between blocks	18	Sheet	50.54	.1322	.7411						
Between replicates	5	000	142.92	.3120	4.6300						
Between varieties Remainder-Error (Intra	15	-	35.10	1.3380	4.2660						
Block) " (Random	57	quo	21.02 ^{(g}		1.2616						
Block)	75	440	39.00	.2236 (g	1.1367 (g						
Total	95	-	35.26	. 4.042	1.8146						
Calculated F value (b	-	-	MS	5.98**	3.75**						

See attached sheet for footnotes (see page 106) 0 = No evidence of disease, 10 = complete hecrosis. (a, (b, (c

Percentage of beets showing signs of rot after taken to laboratory - tops (e appeared healthy.

General mean for 16 varieties included in complete test.

Indicates Error Term used.

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AGRONOMIC EVALUATION TEST

Conducted by: H. E. Brewbaker and H. L. Bush

Location: Ernest and Kenneth Krause Farm, Findlay, Ohio

Cooperation: Northern Ohio Sugar Company

Date of Planting: April 19, 1956

Date of Harvest: September 27-28, 1956

Experimental Design: Triple Lattice. Sugar percentage analyzed as a Randomized

Complete Block since no efficiency was gained thru lattice

analysis for this character.

Size of Plots: 6 rows x 23 feet planted (32 inch rows)

Harvested Area per Plot for Root Yield: 6 rows x 18 feet

Samples for Sucrose Determinations: 2 samples, each 1 row x 18 feet

Stand and Bolter Counts: No bolters developed in this test.

Stand counts taken soon after thinning. Also, beets were

counted in laboratory. The difference probably can be

attributed mostly to root rots.

Recent Field History: 1955 corn

Fertilization of Beet Crop: 500 lbs. per A. of 12-12-12 side dressed at planting time.

Leaf Spot Exposure: Moderate - fairly late in developing

Black Root Exposure: Seedling disease was heavy but seedling stands were excellent

and loss in stand from disease comparatively light. Mature

rots rather light.

Curly Top Exposure: None noted

Other Diseases: None noted

Soil and Seasonal Conditions: Rain and cool weather caused slow growth in spring but beets grew nicely most of season. High nitrates were

indicated by large green tops when harvested. Probably

season was fairly normal.

PULL HOLL WE COME OF THE

H. E. Crowbelor Edit III L. Dush

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. will Enger Compeny

Acril 19, 1956

September 25-25, 1956

Triple Lebiter Sugar percentage embraced as a Million and fomplete Block of man to efficiently was gained blow in the consumer.

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The samples on the source of

in boliers conscend in this test.

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Lead of stocky to the stock of the stock

Cooperator: Northern Ohio Sugar Company by H. E. Brewb aker and H. L. Bush Year: 1956

Location: Ernest and Kenneth Krause Farm, Findlay, Ohio

(Results given as 6 plot averages)

Variety and Description		re-Yield Sugar cle (aGross (lbs.)	Roots (Tons)	Sucrose	Afte Thin			d _{Root} (e	Frost (f	Thin Juice App. Purity (%)
USDA Acc. 2066	4244	5011	15.25	16.43	123	109	1.7	2.0	2.2	92.44
US 401	3939	4619	14.59	15.83	122	108	2.2	1.6	3.8	92.77
USDA Acc. 2064	3868	4577	14.42	15.87	122	103	3.0	0.7	3.0	92.38
USDA Acc. 2058	3662	4402	14.00	15.72	117	93	1.8	1.6	1.5	91.85
USDA Acc. 1367 (Mono)	3608	4339	13.50	16.07	123	100	4.0	1.2	2.5	91.67
US400	3580	4406	13.96	15.78	118	98	2.7	1.2	2.7	90.70
USDA Acc. 1368 (Mono)	3360	3976	12.80	15.53	119	100	43	1.0	2.0	92.40
F54-10H (Mono)	3265	3943	12.58	15.67	128	97	3.0	1.3	0.8	91.52
B740 (Mono) GW674-55R	3249 3218	3878 3935	11.68	16.60	117	99 98	1.8	0.8	0.2	91.96
USDA Synthetic Check		3352	11.12	15.07	105	74	6.2	3.4	0.0	89.58
one plinte of Collect	n coupe	2226	aliante e aliante,	17,001	10)	14	0.2	204	0.0	0,,,0
General Mean(g	3456	4146	13.13	15.79	118	97	2.4	1.4	1.2	91.72
S.E. Variety Mean		122	0.33	. 2442	-	-	-	-	-	.4286
of General Mean	410	2.94	2.4.9	1.55	-	-	-		-	0.47
Diff. req. for Sig. (Odds 19:1)	288 (b	345	0.93	0.69	100			ėm.	-	1.25

Variance Table

-			Mean Squares								
Source of variation	D/F	Gross sugar (C)	Roots (Tons)	Sucrose (%)	Thin Juice App. Purity (%)						
		(1000)	(10110)	1/-/	(1-)						
Between blocks	18	en .	8.06	.3078	1.4372						
Between replicates	5	(800)	9.71	3.5780	2.6680						
Between varieties	15	-	93.20	.8073	3.8993						
Remainder-Error (Intra			7.89(h	020 5	1.1019 ^{(h}						
Block)	57	ton.	7.89	.3735	1.1019						
(Random Block)	75		7.93	.3577(h	1.1824						
Block)	15	_	10/2	42211	20224						
Total.	95	-	21.49	.5982	1.6896						
Calculated F value (b	-	0.0	11.81**	2.26*	3.54**						

⁽a,(b,(c See attached sheet for footnotes. (see page 106)
d 0 = No evidence of disease, 10 = complete necrosis.
e Percentage of beets showing signs of rot after take
f 0 = No apparent frost damage, 10 = tops completely

Indicates Error Term used.

Percentage of beets showing signs of rot after taken to laboratory - tops healthy. 0 = No apparent frost damage, 10 = tops completely killed by frost.

General mean for 16 varieties included in complete test.

language fully a security estimate

28.28 90.29 91.36 91.66 90.10 90.09 91.98 91.98 91.98	8.8 8.8 8.8 7.8 9.9 9.0 9.0 9.0	0.9 6.1 6.1 8.1 8.1 8.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9			122 122 122 122 123 123 124 127 127	15.43 15.37 15.78 15.78 15.78 16.60 15.78	15.25 14.37 14.00 13.95 12.95 12.95 12.95 12.75	501.1 462.7 4.577 4.408 4.258 5.258 5.358 5.358 5.358
						35,79		
	-			- 100		2.55		122
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SUGAR BEET VARIETY EVALUATION TEST - 1956

Conducted by John Cass

at Wallaceburg, Untario, Canada

C. & D. Sugar Co.

(include name of farmer)

Cooperation: C. & D. Suger Co.

Experimental Design: 8 x 8 Letin Square, Design # 1.

Plot Size: No. of rows - kakitx 2x 4 rows

row width = 24 inches.

row longth - 60 feet

Planted: April 23

Harvested: October 11

Rows Harvested: 2 center, hand harvested Net Row Longth Harvested: 55 feet

How were camples for sucress determinations taken:

2- 5 beet samples

How was stand determined:

Harvested beets counted when weighed.

Whens

Reld History: 1955- Oate, 250# 2-16-6
1954- Grain, however, field was tiled and crop did not mature.

Fertilization of this best crops

500# 2-16-6 with seed.

Leaf spot exposure:

Light, Syn. check read 3, all others 1.

Comments on black root of other diseases;

Black root- light

for a month caused slow and unoven emergence. By lete summer Rhizoctonia

Tour comment on reliability of test:

had become noticeable in practically all plots

with dead beets numbering from 3-12 per plot.

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Canada and Dominion Sugar Co. Wallaceburg. Ontario

(Results given as 3 plot averages)

Section of the sectio	Acre Y	ieTâ :		3 · · · · · · · · · · · · · · · · · · ·
Entry : S.P. variety : No. : and local :	Gross : Sugar : Pounds :		Sucrose Percent	: Plants : per 100' of row : Mumber
	7,563 7,414 8,147 7,422 17,557 6,923	18.33 i 20.33 i 20.16 : 21.45 : 19.64 : 20.01 i 18.61 : 18.48 i	19.00 18.89 18.90	96 81 81 94 80 97 72
General Mean	7.333	19.63	18.69	84 :
S.E. Variety Mean S.E. Veriety as %	##± 380 :	1.03 :	0.19	\$ 5
of General Mean Diff. red. for Sig.	4.01 5.18:	5.25	1.00	\$ 5.51
(Odds 19:1) :	17. S.	. N. S	N.S.	: 13

Variance Table

rungmappygonga yapi is +4. Brian -umapo - kasalingg "Sharasin direksi kamarin. M	3	Mean Squares							
Source of variation	D/F	Gross: Sugar (1bs)	Roots (tons)	Sucrose (%)	plants per 100' of row				
Between columns	7	1,003,567:	14.7083	: 0.50	: 481				
Between rows	7 1	1,510,650:	10.6587	: 0.08	388				
Between varieties	7 1	1.735,2758	9.4527	: 0.42	805				
Remainder-Error	142 8	1.855,053:	8.5016	: 0.28	: 171				
Total Calculated F. value b/	63:	1.70	1.11 N.S.	: 1.50 m	1.S: 4.71**				

B/ Designate F. values at 5-percent level with *, and 1-percent level with **.

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AGRONOMIC EVALUATION TEST

Conducted by: H. L. Bissonette

Location: Stewart, Minnesota

Cooperation: Mr. Vince Klinkhammer

Date of planting: 5-5-56

Date of harvest: 9-25-56

Experimental Design: 8 x 8 Latin Square

Size of Plots: 4 (20") rows x 35° = 1/186.8 acre

Harvested area per plot for root yield: 2 center rows of plot. 1/186.8 acre x 2.

Samples for sucrose determinations: 2 ten beet samples from 2 center rows.

Stand and bolter counts: Emergence estimates 5-22-56

Post thinning 7-13-56

Harvest count 9-25-56

No bolters

Recent field history: Alfalfa 2 years

Fertilization of beet crop:

Leaf spot exposure: Natural inoculum-not enough disease present to record

at harvest.

Black root exposure: No indication of severe black root.

Curly top exposure: None observed

Other diseases:

Soil and seasonal conditions: Adequate moisture May through August. Temperature

cool to cold during planting. Generally cool

rest of growing season.

ACROMOMIC EVALUATION TEST

N. L. Bissonetts

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Same of the same of the

08-2-8

02-25-0

sample attal 8 x 6

4 (2011) 2006 2 35° . 1 1186.8 acre

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morose descratoritors: 2 tam bout somming from 2 center ows.

counts: Sucrement 2011 mated 5.22-50

Fort Financing 7-13-50

Harvest count 3-25-50

seems a Abfelfa & ventu

77 7990

sure: Wateral inoculom-words enough disease present to record as marvest.

mea: No indication M severe black root.

Home abserved

out to cost during planting General's con-

Cooperator: Mr. Vince Klinkhammer and American Crystal Sugar Company

Location: Stewart, Minnesota

Year: 1956

(Results given as 8 plot averages)

		Acre y	ield		
Variety and Description	Acc.	Gross Sugar	Roots	Sucrose	Stand
		Lbs。	Tons	%	No.
US 401; WC 5354; incr. of SP 53AB3-0	2057	5691	17.60	16.19	51.8
WC 5301; US 225MS x US 401	2058	5697	17.46	16.34	57.3
WC 5212; incr. of SP 5480-0	2064	5922	19.00	15.75	56.5
WC 5214; incr. of SP 5481-0	2066	6261	19.09	16.41	58.1
WC 5331; SLC 34.176H16m, MSxUS 400(Mis.)	1367	5504	16.78	16.43	56.0
WC 5351; MS,m(SLC 610 x 91MS) x US 400	1368	5347	16.09	16.65	57.2
WC 3216; Synthetic Check	1327	3816	12.10	15.94	46.0
Am-3-S; Check	Local	5482	16.57	16.56	52.3
General Mean		5465	16.84	16.28	54.4
S. B. Variety Mean		232	0.707	0.195	4.12
S. B. Variety Mean as % of General Mean		4.25	4.19	1.20	7.5
L. S. D. (odds 19:1)		663	2.02	0.56	11.6

Variance Table

			Mean	Squares	
Source of variation	D/F	Gross Sugar	Roots	Sucrose	Plants per 140° row
		Lbs.	Lbs.	%	
Between columns (Reps)					
or blocks	7	1,159,286	751.23	3.924	262.2
Between rows	7	1,101,143	206.40	0.689	54.1
Between varieties	7	4,207,857	1106.90	0.761	135.8
Remainder-Brror	42		115.30	0.306	41.0
Calculated F value 1/		6.01**	9.60**	2.49*	3.3**

^{1/} Designate F values at 5-percent level with * and at 1-percent level with **.

THE VINCE IN LEGISLANCE AND AMERICAN CLASSIC STREET COMMENTS

(congruence tole 8 ms nevin selections)

80.5 50.5 50.5 50.0 50.0 57.2 52.5	10,30 15,75 16,41 16,41 16,41 16,55	10.00 10.00 10.00 10.00 10.00 10.00 10.00		2057 1 1 206 200 200 200 200 200 200 200 200 200	MAR MORE OF SPARSHOWN OF SPARSHOWN OF SPARSHOWN OF SPARSHOWN OF SPARSHOWN ACCOUNT OF SPARSHOWN ACCOUNTS ACCOUNT
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enture at 5-percent level with " and at 1-percent level with "".

Hollandale, Minn., Cooperative Test = 1956 American Crystal Sugar Company

Location: Mr. John Ravenhorst's farm at Hollandale, Minnesota Co-operators: Mr. Donald Farus; American Grystal Sugar Company Date of Planting: May 8, 1956 Date of Harvest: September 21, 1956

Field History: 1953 - Sugar Beots

1954 - Sugar Beets

1955 - Sugar Beets

1956 - Sugar Beets

This was an 8 x 8 Latin Square test with eight varieties and eight replications. The plots were 4 rows (22" rows) wide and 35 feet long, making a total of 70 feet harvested. The two center rows were harvested for yield and two 10-beet samples were taken at random for sucrose determinations.

Prior to planting, 50 pounds of 5-20-20 was broadcast and 300 pounds of 5-20-20 was drilled in with the planter. The soil is a muck with slightly more mineral than most of the soil in the Hollandale area.

Diseases: There was quite a bit of leaf spot, with Acc. 1327 and Acc. 1368 being hit the hardest. Detailed readings were not taken.

Reliability: Reliability of this test can be considered as good.

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Hollandale, Minn., Cooperative Test - 1956 American Crystal Sugar Company

		Acre-Yie Gross	ld		Plants Per
Description	Variety	Sugar	Roots	Sucrose	Row
		pounds	tons	percent	number
US #225 MB = US #401	Acc. 2058	3435	15.53	11.06	130.7
SP 5481-0 (LS-RR)	Acc. 2066	3329	15.37	10.83	145.6
Commercial (536)	Am #3 8	3063	13.80	11.10	140.0
US 401	Acc. 2057	3030	14.32	10.58	127.9
SP 5480-0 (LS-RR)	Acc. 2064	2985	14.42	10.35	139.3
SLO 34.176H16 I US 400	Acc. 1367	2882	13.75	10.48	146.0
(SIC 610 x 91) m x UB 400	Aco. 1368	2405	11.51	10.45	149.7
Synthetic Check	Acc. 1327	2379	12.51	9.51	141.6
deneral Mean		2939	13.90	10.5	140.1
SE Variety Mean		85.23	0.35	0.19	4.05
un u as % of Gen. Mes	n	8,19%	6.36%	5.18%	8.17%
Diff. Reg. for Sig. (Odds 1	9:1)	243.21	0.98	0.55	11,45

Total Control		Mear	Squares		Plants Per_
Source of Variation	D/F	Gross Sugar g/ (1bs.)	Roots (tons	Sucrose Percent	100' Row
Columns	7		351.6	0.68	71.9
Blocks	7	-	26.2	6.84	165.6
Varieties	7	***	512.6	2.03	221.1
Error	42	_	27.1	0.29	64,2
Total Calculated F.	Value 63		18.89**	6.83**	3,44

SE lbs. Sugar = Mean lbs. Sugar V (SE lbs. Beets) 2 + (SE % Sugar) 2 (Mean lbs, Beets) (Mean % Sugar)

^{**} Significant at the 1% level

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COOPERATIVE AGRONOMIC EVALUATION TEST-1956 Fort Collins Experiment No. 1A (24, pq. 130)

Conducted by: J. O. Gaskill and J. A. Elder.

Location: Hospital Farm, Fort Collins, Colorado; Field no. 1; under sprinkler.

Cooperation: Colorado Agricultural Experiment Station and Board of County Commissioners of Larimer County.

Date of Planting: May 4.

Date of Harvest: October 1.

Experimental Design: Latin Square, 8 x 8.

Size of Plots: Four rows x 240; rows 200 apart.

Harvested Area per Plot for Root Yield: Two inner rows x 21; all roots topped, washed, and weighed.

Samples for Sucrose Determinations: One 20-beet sample was taken at random from the harvest section of each plot, after lifting, and before piling and topping. Pulp from all roots of any given sample was composited. Duplicate sucrose determinations were made, with a third determination in case the first 2 failed to agree satisfactorily.

Stand and Bolter Counts: Actual counts were made in the 2 inner rows x 21', in each plot, on September 17-18.

Recent Field History: 1951, sugar beets; 1952-55, alfalfa; fall plowed in 1955 following application of 2,4-D to kill the alfalfa.

Fertilization of Beet Crop: Approximately 192 pounds of treble superphosphate was applied on the surface in the fall of 1955, before plowing.

Leaf Spot Exposure: Very severe.

Black Root Exposure: Negligible.

Curly Top Exposure: Negligible (trace).

Other Diseases: Mild sugar beet nematode infestation. Other diseases observed included yellow vein, mosaic, virus yellows, and Rhizoctonia root rot—effects considered negligible, insofar as validity of the test is concerned.

Soil and Seasonal Conditions: Soil type—Fort Collins Loam, light textured phase. As a precautionary measure for root maggot control, Aldrin was applied on the soil surface (approximately 3 3/4 pounds actual Aldrin per acre), before planting, and harrowed in. The crop was sprayed twice with Parathion and DDT for aphid, webworm, and leaf hopper control. The growing season was relatively warm and dry, on the whole. Furrow irrigation was adequate. The field was inoculated (Cercospora beticola) by means of a 4-row tractor sprayer on July 6 and 9, using a spore suspension prepared from hand picked leaves from the 1955 crop. Periodic, light sprinkling, with water, was employed to promote development of leaf spot.

Reliability of Test: Satisfactory.

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COOPERATIVE ACRONOMIC EVALUATION TEST
(Results given as 8-plot averages)

		DI	TOL	Line	Tunes I		Stand	0.4	-	Harry	Harvest Results	1. V.	Contigues
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WO 22013 GW 227-224, LOCAL CHECK	5006		407	00	503	200	117.6		67	12055	15.27	3823	23
Veneral Mean S. E. Variety Mean							116.33			10,3836	14.0570		37.47
S. E. Variety Mean as % of General Mean							1.64				7.17		04。40
L. S. D. (odds 19:1)							5 E			0.56	0.47		200

Variance Table

	• •	d d	Mean Squar	e (variance)	Commenced in which have properly included property and the second second property and the second sec
Source of Variation	D/12	: (Hills per 1001)	: Root Yield : per Acre : (tons)	Sucrose	Gross Sucrose
Rows Columns Varieties Error (remainder)	2222	25.93 25.96 25.22	7.8282 7.8253 9.0929 0.3064	1,2382 7,8253 9,0929 0,3064 0,2177	148,340,3
Total	63	0,89	29,68**	17,27**	34.000**
a/ Foliage Notes (8/23/56):			AND THE PROPERTY OF THE PROPER	And the second section of the second second section is a proper section of the second section of the second section of the second section sect	Chamman Control of Schools and Associated and Assoc

Uniformity: low no. = uniform; high no. = irregular (in size, type, and color). Leaf Spot: 0 = no leaf spot; 10 = total defoliation. Size: low no. = small; high no. = large.

Color: low no. = light green; high no. = dark green. Symbols used to indicate significance of F values:

10,

* : F equal to or greater than 5% point.

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COOPERATIVE AGRONOMIC EVALUATION TEST-1956 Fort Collins Experiment No. 10

Conducted by: J. O. Gaskill and J. A. Elder

Location: George V. Bachmayr Farm (6 mi. N.E. of Fort Collins. Colorado)

Cooperation: George V. Bachmayr and Colorado Agricultural Experiment Station.

Date of Planting: April 25-26.

Date of Harvest: October 5-8.

Experimental Design: Latin Square, 8 x 8.

Size of Plots: Four rows x 50'; rows 20" apart.

Harvested Area per Plot for Root Yield: Two inner rows x 45°; all roots topped, washed, and weighed.

Samples for Sucrose Determinations: Two 20-beet samples were taken at random from the harvest section of each plot, after lifting, and before piling and topping. Pulp from all roots of any given sample was composited. Duplicate sucrose determinations were made, with a third determination in case the first 2 failed to agree satisfactorily.

Stand and Bolter Counts: Actual counts were made in the 2 inner rows x 45, in each plot, on September 25.

Recent Field History: For several years, ending in 1954, the field was in an alfalfa-and-grass pasture; corn was grown in 1955.

Fertilization of Beet Crop: Approximately 10 tons of manure and 200 pounds of treble superphosphate per acre.

Leaf Spot Exposure: Negligible (trace).

Black Root Exposure: Aphanomyces type black root was not observed. Some postemergence damping off was noted, presumably due to other pathogens—stand losses negligible.

Curly Top Exposure: Negligible (trace).

Other Diseases and Pests: Sugar beet root maggot caused some losses in stand after thinning and some irregularities in plant size. Effects of this pest on validity of the test were considered as negligible. A trace of virus yellows was observed late in the season.

Soil and Seasonal Conditions: Soil type—Weld Fine Sandy Loam, Valley Phase. As a precautionary measure for root magget control, Aldrin was applied on the soil surface (approximately 3 3/4 pounds actual Aldrin per acre), before planting, and harrowed in. The crop was sprayed twice with Parathion and DDT for aphid, webworm, and leaf hopper control. The growing season was relatively warm and dry, on the whole. Furrow irrigation was adequate. About 50% defoliation was caused by hail on June 17—roughly 2 weeks after thinning.

Reliability of Test: Good.

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J. O. Gaskill and J. A. Siven

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COOPERATIVE AGRONOMIC EVALUATION TEST EXPERIMENT NO. 1C - 1956, FORT COLLINS, COLORADO (BACHMAYR FARM) (Results given as 8-plot averages)

Arvest Results	Root: : Gross Hisld : Suc. : Suc.	16.10 15.92 5151 16.98 16.04 5338 16.07 15.88 5111 15.92 16.08 5141 15.91 16.76 5340 18.07 16.78 6084 18.54 16.89 6262	0,2525 0,1680 123,15 1,51 1,03 351 0,72 0,48 351
	. cers	0.28 96 0.28 98 0.158 95 0.13 95 0.0 96	88
re Notes a/ : Stand	0	7.5 5.6 106.3 4.0 106.3 5.6 106.5 4.0 105.5 4.0 105.5 6.9 106.3 6.	101 8 44 4 6
000	No. No. U.S. U.	2057 2058 2064 2064 2066 1367 2066 4 1327 2069 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
	Description : Se	US 401; WU 5354; iner. of SF 53AB3-0. Acc., WC 5301; US 225MS x US 401. WC 5212; iner. of SF 5480-0 WC 5214; iner. of JF 5481-0 WC 5331; SLC 34, /5116 m, MS xUS400(Wix.) WC 5351; MS_M(SLCCLO = 91MS) x US 400 WC 3216; Synthetic Check WC 3216; Synthetic Check i 3307 GR 359-53R; local check	General News S. E. V. riety Mean S. E. Var. Mean as % of General Mean T. S. D. (odds 19:1)

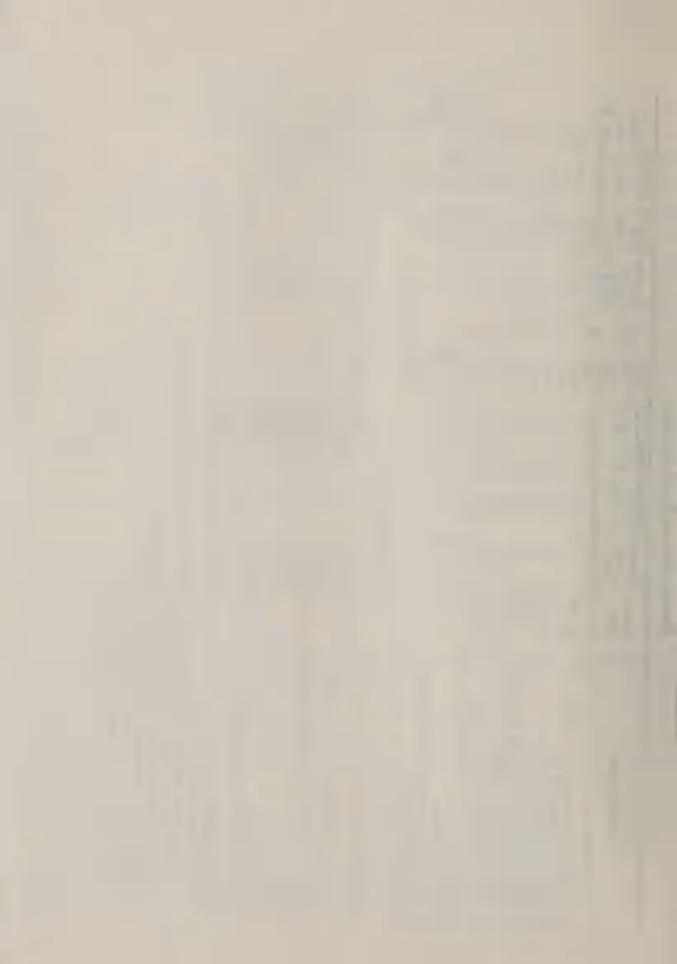
Variance Table

	Other Committee of the		Mean Tillite	(VER	
Source 1 1 - source	D 00 00	Stand (Hills per	Root Meld	Sucrose	: Gross Sucrose per Acre (Ibs.)
ows olumas arieties arror (remainder)	E- E- E- CT	81°.72 17°.35 17°.35 17°.35	5,2260 4,5439 8,3176 0,5102	1,2560 4,6739 1,4596 0,2259	989,305.3 1,778,897.9 1,575,678.1
otal	63	1,28	16.30**	0.46%	12.99%

Foliage Notes (9/19/56):
Uniformity: low no. = uniform; high no. = irregular (in size, type, and color).
Size: low no. = small; high no. = large.
Color: low no. = light green; high no. = dark green.
Symbols used to indicate significance of F values;

* : F equal to or greater than 5% point.

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AGRONOMIC EVALUATION TEST

Conducted by: H. E. Brewbaker and H. L. Bush

Location: G. W. Agr. Experiment Station, Longmont, Colorado

Cooperation: Great Western Sugar Company

Date of Planting: April 4, 1956

Date of Harvest: October 11, 1956

Experimental Design: Randomized Complete Block

Size of Plots: 6 rows x 23 feet planted (22 inch rows)

Harvested Area per Plot for Root Yield: 6 rows x 18 feet

Samples for Sucrose Determinations: 2 samples, each 1 row x 18 feet

Stand and Bolter Counts: Beets counted in lab. for stand

Bolters counted 8/28

Recent Field History: 1955 small grain, 1954 small grain, 1953 beets

Fertilization of Beet Crop: 250 lbs. ammonium nitrate and 150 Treble Super Phosphate

Plowed under in fall of 1955

Leaf Spot Exposure: Moderate - late

Black Root Exposure: None noted

Curly Top Exposure: 3.75% obvious curly top in field September 20

Other Diseases: None noted

Soil and Seasonal Conditions: Beets "irrigated up" - Ample water for irrigation

throughout season.

Tops fairly yellow apparently due to depletion of nitrates

when harvested.

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Cooperator: Great Western Sugar Company by H. E. Brewbaker and H. L. Bush

Year: 1956

Location: Great Western Agricultural Experiment Station, Longmont, Colorado

(Results given as 8 plot averages)

Variety and Description	Acre-Yie Sugar Recoverable (a (lbs.)	dross	Roots (Tons)	Sucrose (%)	Beets per 100 ft. (No.)	Thin Juice App. Purity (%)	Leaf (Spot 9/19	Top(e Vigor 8/28	Bolters (%)
GW359-53R USDA Acc. 2058 USDA Acc. 1367 USDA Acc. 1368 USDA Acc. 2066 USDA Synthetic Check USDA Acc. 2064 US401	6786 6632 6548 6503 6427 6400	3573 7423 7310 7170 7211 7274 7069 7017	25.44 23.01 22.73 21.98 22.08 23.02 22.05 21.75	16.85 16.13 16.08 16.31 16.33 15.80 16.03 16.13	104 97 101 100 97 102 101 98	95.23 96.75 95.74 96.04 95.40 94.43 95.63 95.36	2.0 1.3 2.3 2.1 0.6 5.1 1.4 1.8	2.1 2.4 2.0 2.3 2.6 4.3 2.4 2.9	0.46 1.67 1.30 0.74 1.39 0.37 2.87 0.26
General Mean	6666	7379	22.76	16.21	100	95.57	2.1	2.6	1.13
S.E. Variety Mean	-	153	0.37	. 2040	-	.3141	-		-
of General Mean	- /	2.07	1.64	1.26	-	0.33	-	-	-
Diff. req. for Sig. (Odds 19:1)	391 (b	433	1.06	0.58	en.	0.89	040	-	-

Variance Table

		,	Mea	n Squares	
Source of variation	D/F	Gross sugar (C	Roots	Sucrose	Thin Juice App. Purity
		(lbs.)	(Tons)	(%)	(%)
Between replicates	7	-	19.94	.6600	.9971
Between varieties	7	-	102.92	.7643	3.5929
Remainder-Error	49	••	10.15	.3327	.7890
Total	63	-	21.54	.4170	1.1237
Calculated F value (b	-	440	10.14**	2.30*	4.55**

(a,(b,(c See attached sheet for footnotes. (see page 106)

^{0 =} No evidence of disease, 10 = complete necrosis.

l = Extremely large tops, 10 = very small tops.

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AGRONOMIC EVALUATION TEST

Conducted by: H. E. Brewbaker and H. L. Bush

Location: William Kroskob Farm, Fort Morgan, Colorado

Cooperation: Great Western Sugar Company

Date of Planting: April 10, 1956

Date of Harvest: October 23, 1956

Experimental Design: Randomized Complete Block

Size of Plots: 6 rows x 23 feet planted (22 inch rows)

Harvested Area per Plot for Root Yield: 6 rows x 18 feet

Samples for Sucrose Determinations: 2 samples, each 1 row x 18 feet

Stand and Bolter Counts: Beets counted in lab. for stand - no bolters developed

Recent Field History: 1955 beans, 1954 alfalfa

Fertilization of Beet Crop: 12 tons per A. manure fall plowed

150 lbs. per A. 12-24-0 broadcast in spring

Leaf Spot Exposure: Practically none

Black Root Exposure: None noted

Curly Top Exposure: None noted

Other Diseases: None noted

Soil and Seasonal Conditions:

Irrigation necessary to complete germination. Severe hail storm June 17 after thinning completed June 5, defoliated beets so that approximately one month was required for recovery. A slight stand reduction was caused by the hail. Tops fairly large and dark green when harvested.

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Cooperator: Great Western Sugar Company by H. E. Browbaker and H. L. Bush

Year: 1956

Location: William Kroskob Farm, Fort Morgan, Colorado

(Results given as 8 plot averages)

Variety and Description			Roots (Tons)	Sucrose (%)	Beets per 100 ft. (No.)	Thin Juice App. Purity (%)
GW359-53R USDA Synthetic Check USDA Acc. 2066 USDA Acc. 2058 USDA Acc. 1367 USDA Acc. 2064 US401 USDA Acc. 1368	5390 4291 4274 4254 4235 4196 4193 4027	6153 4848 4805 4748 4770 4750 4743 4569	18.27 14.88 15.44 15.11 15.24 15.94 15.39 14.74	16.84 16.29 15.56 15.71 15.65 14.90 15.41 15.50	102 98 90 96 94 97 94	93.95 94.48 94.78 95.14 94.69 94.48 94.48
General Mean	4358	4917	15.63	15.73	96	94.54
S.E. Variety Mean	-	173	0.49	.2535	-	.3310
of General Mean	-	3.51	3.13	1.61	-	0.35
Diff. req. for Sig. (Odds 19:1)	435 (b	491	1.39	0.72	-	0.94

Variance Table

	,		Mea	n Squares	
Source of variation	D/F	Gross sugar (c (lbs.)	Roots (Tons)	Sucrose (%)	Thin Juice App. Purity (%)
Between replicates	7	-	323.10	3.9571	.3626
Between varieties	7	-	92.96	2.7600	•9543
Remainder-Error	49	-	17.29	.5139	.8761
Total	63	-	59.68	1.1460	1.1903
Calculated F value	-	-	5.38**	5.38**	NS

(a, (b, (c See attached sheet for footnotes which apply to all tables. (see page 106)

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AGRONOMIC EVALUATION TEST

Conducted by: H. E. Brewbaker and H. L. Bush

Location: J. R. Gross Farm, Gering, Nebraska

Cooperation: Great Western Sugar Company

Date of Planting: April 7, 1956

Date of Harvest: October 27, 1956

Experimental Design: Randomized Complete Block

Size of Plots: 6 rows x 23 feet planted (22 inch rows)

Harvested Area per Plot for Root Yield: 6 rows x 18 feet

Samples for Sucrose Determinations: 2 samples, each 1 row x 18 feet

Stand and Bolter Counts: Beets counted in lab. for stand Bolters counted 10/26

Recent Field History: 1955 corn, 1954 small grain, 1953 beets

Fertilization of Beet Crop: 15 tons manure per A. and 150 lbs. per A. treble super

phosphate.

Plowed under spring of 1956.

Leaf Spot Exposure: None noted

Black Root Exposure: None noted

Curly Top Exposure: None Noted

Other Diseases: A few beets affected with Rhizoctonia

Soil and Seasonal Conditions:

Excellent moisture conditions for germination and starting of crop. Thinning delayed somewhat although competition had been alleviated by weeder heads on machine thinner, May 22 followed by machine with 16 spoke 3/4 inch blades, May 24. Thinned by hand June 6.

Webworm damage which was severe in spots shortly after thinning (sprayed about 1 day too late) allowed weeds to get quite large before beets were large enough to hoe, which was also delayed by necessary irrigation. No irrigation after middle of August. AGROUND IN ALMATION TEST

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Cooperator: Great Western Sugar Company by H. E. Brewbaker and H. L. Bush Year: 1956

Location: J. R. Gross Farm, Gering, Nebraska

(Results given as 8 plot averages)

Variety and Description	Su Recoverable	e-Yield gar (a Gross	Roots (Tons)	Sucrose (%)	Beets per 100 ft. (No.)	Thin Juice App. Purity (%)	Bolters (%)
GW359-53R USDA Acc. 2058 USDA Synthetic Check USDA Acc. 1368 USDA Acc. 1367 USDA Acc. 2064 US401 USDA Acc. 2066	6575 6150 5883 5823 5771 5683 5658 5622	7252 6642 6388 6282 6255 6134 6088 6176	19.41 18.45 17.54 17.21 17.24 17.00 16.92 17.05	18.68 18.00 18.21 18.25 18.14 18.04 17.99 18.11	100 99 95 97 97 97 97 95	95.54 96.66 96.38 96.69 96.48 96.69 96.86 95.78	0.00 0.28 0.00 0.00 0.09 1.20 0.28 0.09
General Mean	5896	6399	17.60	18.18	97	96.39	0.24
S.E. Variety Mean	Gent	171	0.45	.1346	Dist	.3411	-
of General Mean	-	2.67	2.56	0.74	-	0.35	-
Diff. req. for Sig. (Odds 19:1)	446 ^{(b}	484	1.28	0.38	-	0.97	-

Variance Table

			Mea	an Squares	
Source of variation	D/F	Gross sugar (C.	Roots	Sucrose	Thin Juice App. Purity
		(lbs.)	(Tons)	(%)	(%)
Between replicates	. 7	~	125.53	. 2886	1.2014
Between varieties	7	ents	56.08	.3957	1.8129
Remainder-Error	49	-	14.81	.1449	.9304
Total,	63	out.	31.69	.1887	1.0586
Calculated F value (b	-	-	3.79**	2.73*	NS

(a, (b, (c See attached sheet for footnotes. (see page 106)

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Results given as S plot averages

00.0 00.0 00.0 00.0 00.0 1.00		18.68 18.21 18.21 18.25 18.14 18.04 18.04	19.41 17.54 17.21 17.21 17.00 16.70	6150 5883 5883 5771 5683 5688 5688
0,24				

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Footnotes for pages 87, 89, 101, 103, 105.

(a Recoverable Sugar

A technique, whereby thin juice purity could be determined from small samples was first used in 1953, following methods recently developed in the G.W. Research Laboratory at Denver. Using the resultant purity figure, a calculated "Recoverable Sugar" is obtained. An example of the calculation is as follows:

Sugar in beets = 12.00% Standard total losses = 0.30% Sugar on beets at sugar end = 12.00 - 0.30 = 11.70%

Assume standard molasses purity = 62.5% 100.0 = 62.5 = 37.5% Impurities on solids in molasses $\frac{62.5}{37.5} = 1.6667\%$ Sugar on impurities in molasses

Sugar sacked

85% purity thin juice = 15% impurities 15/85 = 17.6471% impurities on sugar

Sugar end = $11.70 \times 17.6471\% = 2.06471\%$ on beets Molasses produced = $2.06471 \times 1.66667 = 3.4413\%$ on beets Sugar sacked = 12.00 - (0.30 + 3.4413) = 8.2587% Recoverable sugar = $\frac{8.2587}{12.00} = 68.82\%$

- (b <u>Approximation</u> Calculated as percentage of "difference required for significance" for "gross" sugar on basis of relationship between general means for "Gross" and "Recoverable" sugar.
- (c Calculated from the formula:

S lbs. sugar =
$$\frac{\text{S lbs. beets}}{\text{Mean lbs. beets}}^2 + \left(\frac{\text{S \% sugar}}{\text{mean \% sugar}}\right)^2$$

The best 42, 87, 102, 103, 105.

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Rocky Ford U.S.D.A. Co-operative Variety Test

Rocky Ford Co-operative Variety Test - 1956 Conducted on the Colorado A. & M. Branch Station in Co-operation with Mr. Herman Fauber.

Latin Square, 8 x 8. Plots 4 rows wide (22* rows), 35 feet long. Planted April 22, 1956; harvested October 10, 1956. Two inner rows of each plot with a total row length of 70 feet was harvested. Two ten-beet samples was taken at random from the harvested section of each plot after lifting.

Field history and fertilisation: Onions in 1952 with 500# per acre of 6-24-6 applied; Corn in 1953 with 100# per acre of N applied as Ammonium Nitrate in water; Potatoes in 1954 with 500# per acre of 6-24-6 applied; 1955 Potatoes with 500# per acre of 6-24-6 and 1956 Beets. There was 300 pounds per acre of 6-24-6 applied prior to planting, 75 pounds of nitrogen per acre of 20-53-0 built up with ammonium nitrate and 75 pounds per acre of phosphate of 20-53-0. It was quite evident that the soil had a high degree of fertility through the growing season.

Soil type: Rocky Ford Clay Loam.

Diseases: An estimated ten percent of the beets were infected with curly top virus and five percent had yellow vein. No leaf spot or black rot.

Reliability: Results are considered quite reliable.

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Rocky Ford U.S.D.A. Co-operative Test = 1956

Panadakian	there is not compute the administrative constitution of	Acre-Yiel Gross			Plants Per 100'
Description	Variety	Sugar	Roots	Sucrose	Row
Commercial (524) Synthetic Check	Am #2 Acc. 1327	9715 9309	tons 30.96 31.26	15.69 14.89	108.6 111.4
SLC 34.176H16 - X US 400 US 401	Acc. 1367 Acc. 2057	8579 8266	30.77	13.94	114.3
US 225 M3 x US 401 SP 5481-0 (LS-RR)	Acc. 2058 Acc. 2066	8194 7886	27.59 26.50	14.85	108.6
(SLC 610 = 91) mm x US 400 SP 5480-0 (LS-RR)	Acc. 2064	6739 5992	29.51 26.11	14.09	120.0
General Mean		8085	28,92	14.7	110.7
S. E. Variety Mean n as % of Gen. N	lean	263.6	7.73%	0.26 5.04%	2.90 7.35%
Diff. Req. for Sig. (odds 19):1)	752.1	2,26	0.75	8.27

		Mean Sq	uares		Plants Per
Source of Variation	D/F	Gross Sugar 2/ (1bs.)	Roots (tons)	Sucrose Percent	100: Row
Columns	7	_	404.4	0.96	209.1
Blocks	'7	-	390.5	0.70	68.6
Varieties	7		1141.5	2.41	77.1
Fror	42	003	173.0	0.55	32.9
Total Calculated F. Valu	63 te	470	6,59**	4.38**	2.34*

SE lbs. Sugar = Mean lbs. Sugar

say prom		Magazina and Spreasure					
//	SE J	bs.	Beets	2+	(SE %	Suger	2
7	Mean	AND O	The same of the same of	-	(Mean %	Sugar	- marine
1	F.T.C. STY	1 W 107 0	100000		(1,10 cm; 10	angut)	

^{*} Significant at the 1% level ** Significant at the 5% level

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Grand Island U.S.D.A. Go-operative Test - 1956

Grand Island Co-operative Test - 1956 Conducted on the Sass Bros. farm East of Grand Island. Mr. E. G. Kidder, Agriculture Superintendent cooperated in handling this test.

Latin Square, 8 x 8, Plot 4 rows wide (29* rows), 35 feet long. Planted April 26, 1956, harvested October 22, 1956. Two inner rows of each plot with a total row length of 70 feet were harvested. Two ten-beet samples were taken at random from the harvested section of each plot after lifting.

Field History and Fertilization:

1956 - Beets

1955 - Corn

1954 - Beets

1953 - Corn

Prior to planting beets, the field was fertilized by plowing down 300# of 13-39-0 and 80 pounds of Annhydrous Ammonia was also applied ahead of plowing. The soil could be considered as a sandy loam in type.

Disease: A slight amount of yellow vein present, estimated at five percent. The first block also had a slight infection of less-miner. No leaf spot, curly-top or black rot.

Reliability: This test can be considered reliable

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Grand Island U.S.B.A. Co-operative Test - 1956

		Acre-Yiel Gross	A	teritoti yedi valite isi in indireci in indireci Perenten ken indide upubud	Plants For
Description	Variety	Sugar	Roota	Sucrose	Flow
SIC 34.176H16 mm x US 400 (SIC 610 = 91) mm x US 400 Commercial (524) US 225 M3 x US 401 SP 5481-0 (LS-AR) SP 5480-0 (LS-AR) Synthetic Check US 401	Acc. 1367 Acc. 1368 Am #2 Acc. 2058 Acc. 2066 Acc. 2064 Acc. 1327 Acc. 2057	20unda 6092 7744 7668 7666 7615 7946 7512 7503	27.34 25.73 25.06 26.38 27.18 26.99 25.31 26.18	Derechb 14.80 15.05 15.30 14.53 14.01 13.98 14.84 14.33	105.6 107.3 110.6 107.9 105.9 112.3 109.4
General Mean		7668	25.27	34.6	109.1
S. E. Variety Mean	oon	252.97	0.75	0.25 4.78%	1.73 4.60%
Diff. Req. for Sig. (Odds 1	9:1)	723.68	2.13	0.71	5.07

		Mean	Squares		Plants Per
Source of Variation	5/8	Gress Sugar A	Roota (tone)	Sucrose Tercent	100° Roy
Columns	7	4000	160.74	1.86	50.24
Blooks	7	163	3122.62	1.50	42.43
Varioties	7	ipin .	361.42	1.83	35.57
Error	42	mb .	269.19	0.49	32,40
Total Calculated F.	Value 63	•	MS	7.7500	2.67*
■ Calculated	from the f	ormiai an ibs. Jugar V	V-shippingson pythoches or the country of	Ecoto 2	

^{*} Significant at the 5% level ** Significant at the 1% level

EVALUATION OF ELITE SEED, SYNTHETIC VARIETIES, AND HYBRIDS

Suitable for

GREAT LAKES REGION

Dewey Stewart H. W. Bockstahler G. J. Hogaboam G. E. Coe

C. L. Schneider

H. L. Kohls, Michigan Agricultural Experiment Station

P. A. Reeve, Farmers and Manufacturers Beet Sugar Association

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Derey Stewart G. J. Hagabean

R. L. Socia, Montagen Agriculturel.

P. p. Secre, formers and Manchesters. Beer Suger Association. Evaluation of Elite Seed of Synthetic Varieties and Hybrids Suitable for the Great Lakes Region

Introduction

by Dewey Stewart

Field tests have been conducted in Michigan and Ohio to evaluate new developments in breeding for resistance to black root and leaf spot. Members of Sugar Crops staff who conducted tests are H. W. Bockstahler and G. J. Hogaboam (tests at Ithaca and East Lansing, Mich. 1), and J. O. Gaskill (tests at Fort Collins, Colo.). Tests were conducted with the cooperation of the Farmers and Manufacturers Beet Sugar Association at Auburn and Saginaw, Michigan, and also at Green Springs and Ottawa, Ohio. The description of the varieties included in the tests conducted in the humid region is given on page 112a. The tests conducted at Fort Collins, Colorado (pages 128-130) included 8 of the varieties evaluated in the humid region, the local, and US 104 and its relatives.

Leaf spot was a negligible factor in all tests conducted in Michigan and Ohio. Leaf spot readings have been reported for the observation test conducted under the sprinkler system at Fort Collins, Colorado.

Black root exposure is reported as being severe in tests at East Lansing, Michigan, and Ottawa, Ohio, and light in tests conducted at Ithaca, Michigan, and Green Springs, Ohio.

The results of 6 tests conducted in the humid area are presented in Summary Tables 1, 2, and 3.

Accession 1353, which is an increase of SP 52108-0, gave outstanding performance in the 8 X 8 Evaluation Tests of 1955 and continues to show superiority over US 400 or US 401 in 1956. It is of interest to note that Accession 2062 and Accession 2063, which were developed by mass selection from SP 50B3-0 (the parental Breeder Seed of US 400), show, as an average, slightly more than 6 percent increase over commercial US 400 in acre yield of gross sugar.

The outstanding performance in these tests was given by the hybrid SP55ABlOP. Although the sucrose percentage for this hybrid was slightly below that of US 400, the acre yield of roots was 19 percent above US 400. This hybrid, which was produced by use of male sterility, demonstrates the potential productivity that can be obtained by improved techniques in breeding methods.

Accession 2067 (WC 5216), which is an increase of SP 5460-0, is derived from a single polycross out of a larger production that gave also Accession 2066 which is presented in Part V of this report. The polycross progeny SP 53AB1-65, from which Accession 2067 was derived, showed high resistance to leaf spot and excellent sucrose percentage in tests conducted on the Plant Industry Station. In the 6 tests summarized in Tables 1, 2, and 3

Conducted in cooperation with H. L. Kohls of Michigan Agricultural Experiment Station.

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without leaf spot as a factor in growth of the plants, Accession 2067 was approximately equal to US 400 in sucrose percentage and slightly lower in acre yield of roots. However, in the test at Fort Collins, Colorado, where leaf spot was not a factor, Accession 2067 made a relatively better showing in sucrose percentage.

It is of interest to compare the performance of Accession 2067 with US 400 and US 401 in replicated tests conducted under severe leaf spot exposure at the Plant Industry Station, Beltsville, Maryland, and under moderate black root exposure at Waseca, Minnesota. In these tests (page 131), Accession 2067 gave, as an average for 3 tests, sucrose approximately one percentage unit above US 400 or US 401. However, it should be pointed out that the superiority of Accession 2067 over US 400 in the tests on the Plant Industry Station was greatly influenced by its higher leaf spot resistance.

t a factor in growth of the plants, Accession 2067 was
to 76 76 00 in sucrose percentees and singhily lower in
Homemer, in the test of Port Gollins, Goireado, where
a factor, Accession 1067 nade a relatively better about

regt to compare the perf regner of threselow 2007 with Ws hot a peoplicated tests on duried asvers leaf upot expression frederity Stated on, Pelicylla, Horgiand, and under maderate maderate at Marsets, Dimesots, In these tests (page 131), Sy gave, as an autorge for 3 tests; number approximately tag unit along US 100 or US ho. Revers, is should be potated the experience of the tests on approximately of accession 2067 over US hot on the tests on supercopity of accession 2067 over US hot of the tests on supercopity of accession littlement by its tripper leaf agent

Description of Elite Seed, Synthetic Varieties, and Hybrids Suitable for the Great Lakes Region 1956

Summaries and reports of individual tests are given on pages 113-131 of this report

See	d Supplied	Description of Variety
1.	Acc. 1353	West Coast 4216. Increase of Breeder Seed SP 52108-0 which was outstanding in performance in 8 X 8 Evaluation Tests of 1955.
2.	Acc. 2056	West Coast 4441. Increase of Breeder Seed SP 50B3-0. This is US 400.
3.	Acc. 2057	West Coast 5354. Increase of Breeder Seed SP 53AB3-0, a reselection from SP 50B3-0. This is US 401.
4.	Acc. 2062	West Coast 5210. Increase of Breeder Seed SP 54A3-0, a reselection from SP 50B3-0.
5.	Acc. 2063	West Coast 5211. Increase of Breeder Seed SP 54B3-0, a progeny selection from SP 50B3-0.
6.	Acc. 2065	West Coast 5213. Increase of Breeder Seed SP 53AB2-0, a progeny selection from SP 51B1- progenies.
7.	Acc. 2067	West Coast 5215. Increase of Breeder Seed SP 5460-0, a selection from SP 53AB1-65. High sucrose has been indicated for SP 5460-0 in tests conducted on the Plant Industry Station.
8.	Acc. 2068	West Coast 5216. Increase of Breeder Seed SP 54B1-0, a progeny selection from SP 53AB1- (SP 51B1-).
9.	SP 55AB10P	Hybrid using cytoplasmic male sterility in hybrid seed production, East Lansing.
10.	SP 55600-01	Broad base selection for resistance to leaf spot and black root, Plant Industry Station.
11.	Mich. 345-S54M-34	Developed by H. L. Kohls, Mich. Agr. Expit. Station

12. US 216 X 226 Commercial

For description of related varieties, see page 66a, Part V

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and reported in this that the strong best on pases 15 [wild in this top or

distal to country and

West Gosci LEIS. Incress of Ares or Seet i SIPS-O which was orbetanding to parformation to I X E Erstustion Tests of 1955.

West Soast bild. Increase of breeder John SF 50F3-0. This is 15 year

west from Sign. increase of Organization Single-

West boast 521 s. A. Freez of Breezes ess S.P. Shing-O.

West Coset FEEL. Increase of Proceed ked I ILB)-0.

West Hoset 5217, insense of Drucder Book & SylberDy a program, belief to from ST 51Al- propendes.

West Gosef 5215. Terrises of Encycles in a Sign-O., a pelection from as 5;00-0., a pelection from as 5;00-0. All terrises of the second for a second for the second for the

Near Woses 5216 In rease of broom Suen SP 5281-0.

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feel Demeloped by H. L. Kehls, Steh. Ler Ensit. States

E 226 Gammar ini

For description of related variables, see page 662. Fort I

Summary Table L.--dere-jield of gross sugar in agronomic tests conducted in the Great Lakes resistive in 1956 to evaluate Breeder Seed and Elites of synthetic varieties of sugar beets developed for the humid region. Data are given as 8-plot averages.

	Pd		Lo	Location of	Meld Tests	20		42	
Description	Seed Planted	1	Saginaw Mich.	. Ithaca	E.Lansing	Green Springs.0.	Ottawa	Mean of	us 400
Charles of the Control of the Contro	and the second s	: Founds	* Formas	: Pounds	Pounds	Pounds	- Pounds	Pounds	TOTAL CONTROLLE STORY
SP 52108-0	. Acc 35	5,112	, h,160	t. 558	2,829	3,825	: 2,963	3,911	1.05.6
US 1,00	2056	4,5547	H. 456	. 4,103	2,702	3,823	12°57,89	3,703	100.0
TOT SU	Acc. 2057	4,234	26764	1,613	2,650	3,790	2,505	3,687	1.66
SP 5443-0	: Acc. 2062	5,479	: 4,264	1,710	2,574	3,585	: 2,980	3,932	106.2
SP 54B3-0	: Acc. 2063	5,208	1,028	1,716	2,660	3,958	: 3,123	3,949	106.6
SP 534B2-0	. Acc. 2065	: 4,316	: 4,123	: 4,975	2,499	3,837	: 2,744	: 3,749	101.2
SP 5460-0	. Acc. 2067	: 4,782	3,564	41564	2,545	3,164	2,73L	: 3,547	95.8
SP 54,81-0	. Acc. 2068	47664	3,835	: h,851	2,372	3,640	2,862	3,756	101.4
F1 Hybrid	: SP 55ABloP	5,370	4,719	5,395	3,005	1,441	: 3,300	: 4,372	118.1
Broad Base Syn.	: SP 55600-01	5,474	790,4	: 4,351	2,711	3,712	: 2,833	3,858	104.2
Sel.Bl.Rt. Res. : Mich. Stat	: Mich. State2/	: 5,136	3,961	: 4,235	2,471	3,403	2,139	3,558	1.96
Commercial	US 216 X 226	1,281	3,401	3,837	2,369	3,515	2,005	3,235	87.2
	Mean of each Test LSD (Odds 19:1)	: 4,909 835	: 4,064 330	: 4,572 : 749	2,616	3,726	2,739		
1 /									

1 The results of field tests conducted at Fort Collins, Colorado, with most of the varieties listed in this table are given on pages 128-131.

2/ Mich. 345-354M-34 was developed by H. L. Kohls, Farm Grops Department, Michigan Agricultural Experiment Station.

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Summary Table 2.--Acre-yield of roots in agronomic tests conducted in the Great Lakes area to evaluate Breeder Seed and Ellites of synthetic varieties of sugar beets developed for the humid region. Data are given as 8-plot averages.

			L	Location of	Field Tests				
Description	Seed Planted :	Auburn Mich.	:Saginaw	: Ithaca : Mich.	to the	Green :	Ottawa :	Mean of :	US 400
		tons	tons	tons	tons	tons	tons	cons	
SP 52108-0	. Acr 1353	12.85	: 12.24	13.02	10.08	12.74	7.96	11.48	103.4
US 400	2. 2056	11.58	13.13	11.98	10.15	12.68	7.09	T. T.	100.0
us 401	Acc. 2057	11.16	12.25	13.33	. 10.35	12.66	13	97.77	100.5
SP 5443-0	. Acc. 2062	13.83	12.60	13.77	10.02	12.25	8.22	11.78	106.1
SP 54B3-0	Acc. 2063	13.20	12.23	13.70	: 10.16	13.11	8.44	11.81	106.4
SP 53AB2-0	Acc. 2065	10.91	: 11.95	. 14.12	8.83	12.24	7.38	10.01	98.3
SP 5460-0	Acc. 2067	12.20	10.85	. 12.86	. 69.63	10.87	7.33	10.62	7.56
SP 54B1-0	. Acc. 2068	12.77	97.11	14.29	9.28	12.61	7.86	11.43	103.0
Fl Hybrid	: SP 55ABloP :	14.28	54. #	. 15.99		14.81	9.05	13.21	0.611
Broad Base Syn.: SP 55600-01	: SP 55600-01	13.84	: 12.15	: 12.79	10.09	12.38	7.57	11.47	103.3
Sel.Bl.Rt. Res.: Mich. State_/	. Mich. State2/	12.68	11.24	11.96	9.23	10.89	5.78	10.30	92.8
Commercial	. US 216 X 226	10.94	9.88	: 11.11	8.32	11.18	5.56	9.50	85.6
	Mean of each Test : LSD (Odds 19:1) :	12.52	12.06	13.24	9.77	12.37	7.45		

1/ The results of field tests conducted at Fort Collins, Colorado, with most of the varieties listed in this table are given on pages 128-131.

2/ Mich. 345-554M-34 was developed by H. L. Kohls, Farm Crops Department, Michigan Agricultural Experiment Station

Summary Table 3.--Sucrose percentages in agronomic tests conducted in the Great Lakes area in 1956 to evaluate Breeder Seed and Flites of synthetic varieties of sugar beets developed for the humid region. Data are given as 8-plot averages. Data are given an 8-plot averages.

	00	••		Location of	f Field Tests	45		nq	
Description	: Seed Flanted	: Auburn : Mich.	Saginaw Mich.	: Ithaca	Lansing	Springs, 0.	Ottawa	Mean of	15 Joo
	60	30	12 00	.e		Q.	la Q	4,0	
SP 52108-0	. 100, 1353	: 19.87	17.01	: 17.1h	10° 11	12:11	18-61	96.99	S. E.
US 1,000	.ce. 2056	19.65	16.98	: 17.03	bud (L)	15.08 0.72	82.63	16.70	100,0
US TOT	: Acc. 2057	: 19.02	17.12	: 17.29	22,78	15.03	18,16	16.57	99.2
SP 5443-0	. Acc. 2062	: 19.81	16.91	16.98	12,81	17.64	18.10	The second	98
SP 54.83-0	. Acc. 2063	: 19.72	16.49	: 17.18	13.05	15.08	18,48	16.67	8
SP 534B2-0	. Acc. 2065	: 19.80	17.29	17.57	: 114.09	15.68	18.66	200	102.9
SP 5460-0	. Acc. 2067	: 19.49	: 16.37	: 17.49	: 13.21	14.54	18.61	16.62	20,00
SP 54B1-0	. Acc. 2068	: 19.47	16.26	16.95	12.72	H.43	18.20		97.8
Fl Hybrid	: SP 55ABLOP	: 18.74	: 16.31	16.84	13.54	15,00	18.24	20	28
Broad Base Syn.	: SP 55600-01	: 19.79	: 16.73	: 16.97	: 13.th	14.97	18.71	16.3	100.2
Sel.Bl.Rt. Res.	: Mich. State2/	20.27	17.66	: 17.69	: 13.37	15.61	18-148	17.18	102.9
Commercial	: US 216 X 226	: 19.56	. 17.25	: 17.17	: 14.21	15.72	18.04	15.99	
	Mean of each Test LSD (Odds 19:1)	: 19.60	16.86	: 17.19	13.38	15.07	18,37	** ==	
/				The state of the s	The state of the last of the l				-

1/ The results of field tests conducted at Fort Collins, Colorado, with most of the varieties listed in this table are given on pages 128-131.

Mich. 345-S54M-34 was developed by H. L. Kohls, Farm Crops Department, Michigan Agricultural Experiment Station.

SUCAR BENT VARIETY EVALUATION TEST - 19 56

Conducted by P.A. Reeve, Mark Berrett, Grant Michol

Auburn, Michigan

Fred Wegener (1mglude 1 of farmer)

Cooperation: F.& M., Monitor Sugar Div., Fred Wegener, farmer

Experimental Design: 8 x 8 Latin Square, Design # 4.
12 x 8 Random Bhock, Design # 27.

Plot Sizes No. of The 4 row

now longth - 50 feet

Plantod: May 22

Harvooted: 8 x 8-- Uctober 15 12 x 8-- October 16

Rows Harvested: 2 center, hand harvested Net Row Length Harvested: 48 feet

Now were samples for sucrose determinations taken:

2- 10 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed.

When:

 Field History:
 1955- Beans 125/ 3-12-12

 1954- Beans 125/ 3-12-12

 1953- Clover plowed down

Fortilization of this best Grops 300# 3-12-12 broadcast 300# 4-16-16 at planting

Leaf spot exposure: None

Comments on black root or other diseases:

Hone

Soil and seasonal conditions; Seedbod- wet

Your comment on reliability of toots

8x8 -- good

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(Results given . . plot averages)

	1	: Acre	Yield	ons in the transfer transfer the open and the state of the open of	\$
Entry No.	S.P. variety and local	Gross Sugar Pounds	Roots	Sucrose Percent	Plents per 100' of row Number
1234567890112	: Acc. 1353 : Acc. 2056 : Acc. 2057 : Acc. 2063 : Acc. 2065 : Acc. 2067 : Acc. 2068 : SP 55AB10P : SP 55600-01 : Kohls : Local	4.782 4,782 4,974 5.370 5,474	12.85 11.58 11.16 13.83 13.20 10.91 12.20 12.77 14.28 13.84 12.68 10.94	19.87 19.65 19.02 19.81 19.72 19.80 19.49 19.47 18.74 19.79 20.27 19.56	: 76 : 71 : 48 : 83 : 76 : 55 : 57 : 51 : 83 : 78 : 71
Gener	al Mean	4,909	12.52	19.60	. 68
	Variety Mean	295	0.74	0.20	\$
of G	Variety as % eneral Mean req. for Sig.	6.04	5.89	1.03	5.43
	das 19:1)	835	2.08	: 0.57	: 10

Variance Table

	1	i Mean Squares						
Source of variation	D/F	: Gross : Sugar : (1bs) :	Roots (tons)	Sucrose (%)	:	Plants per 100' of row		
Between columns Between rows Between varieties Remainder-Error	: 7 : 11 : c/	881,870 : :1,739,727 : : 703,000 :	11.0132	: 0.30 : 1.28 : 0.32		185 1,214 109		
Total Calculated F. value b/	: 0/	2.47*:	2.53**	: 3.91!**	0	11.14**		

- b/ Designate F. values at 5-percent level with *, and 1-percent level with **
- c/ Due to missing plot calculations the following table of D/F should be used:

	:lbs	sucrose/acre	ı	tons	roots/acre	\$	% sucrose	: beets/1001
error	.:	75	\$ 0	age to compare to every	75	1	77	: 75
remainder		93	1		93	\$	95	93

(constant sold a se ments actions)

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Conference : 10 may 2 1 and 1

VARILETY EVALUATION TO - 19 56

Conducted by P. A. Reeve, Mark Berrett

at Saginaw, Michigan

(include new f fram)

Cooperations F.& M., & Elmer Rader

. Reperimental Design: 8 x 8 Latin Square, Design # 5.
12 x 8 Random block, Design # 28.

Plot Size: No. of I - 4 rows
II width - 28 inches
I length - 50 feet

Planteds June 7

Harvested: 8 x 8 - October 10 12 x 8 - October 16

Rove Harvested: 2 center-hand hervested Net Row Length Harvested: 48 feet

How were samples for record determinations taken:

2- 10 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed.

Whene

Field History: 1955- Alfalfa, plowed down 1954- Oats, seeded, 300# 5-20-20

1953- Beets, 300 # 0-20-20

Portilization of this best crops 500# 5-20-20

Leaf spot exposure: None

Comments on black root as other diseases;

None

Soil and seasonal conditions: Sendbed- dry.

Your comment on reliability of tests

Both tests- excellent.

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(Results given as & plot averages)

communitations from the deal of the contemporary contemporary and the contemporary contemporary and the contemporary conte	Acre	Yield	•	- monoconsque committee - committee
Entry: S.P. variety: No.: and local	Gross Sugar Pounds	: Roots	Sucrose Percent	Plants per 100' of row Mumber
1 : Acc. 1353 2 : Acc. 2056 3 : Acc. 2057 4 : Acc. 2062 5 : Acc. 2063 6 : Acc. 2065 7 : Acc. 2066 9 : SP 55AB10P 10 : SP 55600-01 11 : Kohls 12 : Local	4,456 4,192 4,264 4,028 4,123 3,564 3,835	: 12.24 : 13.13 : 12.25 : 12.60 : 12.23 : 11.95 : 10.85 : 11.79 : 14.45 : 12.15 : 11.24 : 9.88	17.01 16.98 17.12 16.91 16.49 17.29 16.37 16.26 16.31 16.73 17.66 17.25	105 105 102 101 98 101 93 85 85 82 94 92
General Mean	11,054	: 12.06	15.85	96
S.E. Variety lean	11.7	0.31	0.25	7
S.E. Variety as % of deneral lean	2.88	2.53	1.47	3.74
Diff. rec. for Sig. (Odds 19:1)	330	: 0.85	0.70	10

Variance Table

Stillige recognition of providents and the contract of the con	**************************************	9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Mean	Squares	The second desirable form region fragmentation and the second of the
Source of variation	D/F	Gross Sugar (lbs)	Roots (tons)	Sucrose	: Plants per : 100' of row
Between columns	*	: ;		to the second contract of the second contract	Property of the complete against the complete and the com
Between rows	: 7	: 306,849 :	1.6353	: 3.77	; 71
Between varieties	: 11	:1,021,869 :	10.3358	: 1.55	: 431
Remainder-Error	: c/	: 109,857 :	0.7458	: 0.49	: 103
Total	: c/	The second secon		Statistical controller or redesires are week tradap	th places to take the participant of the participan
Calculated F. value b/		: 9.30**:	13.64**	: 3.15**	4.18**

- Designate F. values at 5-percent level with *, and 1-percent level with **.
- Due to missing plot calculations the following table of D/F should be used:

	:lbs	sucrose/	acre : t	ons roots/ac	re : %	sucrose	: be	ets/1001
error	*	76		75	D D	71	*	76
remeinder	:	94	:	94	:	95	:	94

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	: 304,345 : 101,425,43 : 102,425	11	

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SUGAR BEST VARIETY INALUATION TEST - 19 56

Commence by H. Bocksteller, T. J. Horebonn

I Ithaca, ichigi

Oulder

Ocoperation: USDA.

Experimental Design: 12 x

Plot Simos No. of rows - rows

row width = 20 inches
row length - 58 feet

Planted: May 22

Harvested: October 2 & 3.

Rows Harrosted: 2 center, hand harvested Net Row Length Harvested: 56 feet

How were samples for sucrese determinations takens

2-15 beet samples from topped piles

How was stand determineds

Harvested beets counted when weighed

Whens

Field History: 1955- Beans 1954- Corn

1953- Wheat

Fertilisation of this boot crops

Leaf spot exposure: 350 # 5-20-20 with .25% soron

None

Comments on black root or other diseases;

Blackroot- light

Soil and seasonal conditions;

Seedbed- moist

Your comment on reliability of tests

Good.

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John -Secret 1

Don Houlden Ithaca, Michigan

(Results given as 8 plot averages)

The state of the s	gagar Mindowsgagaraadhin, dringgil () fore poor p. () () () (dir shee) yet ; debud	Acre	Yield		Minimization collarge - to tion continued symposium
Entry :	S.P. variety and local	Gross		•	Plants per 100'
and the same of the same	and with the improved. Again the day account on the community of	: Sugar	Roots	: Sucrose	of row
		: Founds	Tons	Percent	Number
1 2	Acc. 1353 Acc. 2056	: 4,558	13.02	17.14 17.03	76 72
3	Acc. 2057	1 4,613	: 13.33	: 17.29	82
4 :	Acc. 2062	: 4,710	: 13.77	: 15.98	75
5	Acc. 2063	: 4,716 : 4,975	: 13.70	: 17.18	70
7	Acc. 2067	14,514	: 12.86	17.57	79
8	Acc. 2068	: 4,851	: 14.29	16.95	54
9 :	SP 55AB10P	: 5.395	: 15.99	: 15.84	62
10	SP 55600-01	: 4,351	: 12.79	16.97	71
11 1	Kohls	: 4,235	: 11.95	: 17.69	74
15	Local	3,837	: 11.11	17.17	75
Genera	al Hean	4,572	13.24	17.19	714
	Variety Mean	250	0.71	0.18	4
of Ge	eneral Hean	: 5.82	5.40	: 1.07	5.97
	req. for Sig. lds 19:1)	749	2.01	0.52	12

Variance Table

dischargement submiderate abundentet abundentet ab ab ab ab ab about description of the experimental about the experiment of the experimen		lean Squeres					
Source of variation	D/F	: Gross : Sugar : (lbs) :	Roots (tons)	Sucrose (%)	Plents per 100' of row		
Between columns :	and in definition grows down	:	- managatalahan nyammanganda nyampagamananka misa - di 1999ka	B and a second second			
Between rows	7	:3,307,300:	20.3188	: 1.25	: 269		
Between varieties :	11	:1,370,618 :	13.1820	: 0.60	: 342		
Remainder-Error	77	: 565,404:	4.0859	: 0.27	: 156		
Total :	95	1		and the second s	The second secon		
Calculated F. value by:		: 2.42*:	3.23**	: 2.24*	1 2.19*		

b/ Designate F. values at 5-percent level with *, and 1-percent level with **

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							S.F. variety	
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values at 5-percent level with ", and 1-percent

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SUGAR BEET VARIETY EVALUATION TEST - 19 56

Conducted by H.W. Bockstahler, G.J. Horaboam

East Lansing, Michigan

A.C. Brook
(include name of farmer)

Cooperation A.C. Brook, farmer

Experimental Design: 12 x 8 Random Block, Design # 26

Plot Sixe: No. of rows - 5 rows Muck soil.

row width - 28 inches
length - 44 feet

Planted: June 11

Harvested: October 19

How Harvested: 5 rows, hand harvested Net Row Length Harvested: 42 feet

How were samples for sacrore determinations takens

2- 15 beet samples from topped piles

How was stand determined:

Harvested beets counted when weighed.

When:

Field History: 1955- Beets

1954- Spearmint 1953- same

Fertilization of this best crops

500# salt, 350# 5-20-20 broadcast, 300# 5-20-20 in row.

Leaf spot exposure:

None.

Comments on black root or other diseases:

Black root- severe

Scil and seasonal conditions: Seedbed- moist.

Your comment on reliability of test:

10,51 - Tele MONTANDAMI YEMES Y TORE RADIE

Book of the transfer with the same will be to do to

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ind, A.C. Brook, Permer

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Associated beets counted when wotrhed.

1956- Borks 1954- Specimint 1956-2 Lora

ELE TOME SHOW SHOW SARULED HYDERGOUSE. DOOM 5-2.-20 IN FIN

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Excellent.

Asael Brook East Lansing, Michigan

(Results given as 8 plot averages)

Share and a share annual angular species is	The state of the s	a Acre	Yield	y 9	and the state of t
Entry :	S.P. variety and local	Gross Sugar Pounds	Roots Ons	Sucrose Percent	Plants per 100' of row Number
1 2 3 4 5 6 7 8 9 10	Acc. 2056 Acc. 2057 Acc. 2062 Acc. 2063 Acc. 2065 Acc. 2067 Acc. 2068 SP 55AB1UP SP 55600-01 Local	2,450 2,574 2,460 2,499 2,545 2,372 3,005 2,711 2,471	9.63 9.28 11.08 10.09	14.04 13.27 12.78 12.61 13.05 14.09 13.21 12.72 13.54 13.41 13.37 14.21	65 70 62 64 52 67 59 49 55 56
Genera	l Hean	2,616	9.77	: 13.38	60
S.E. V	Variety Mean Variety as % eneral Mean	3.85	3.08	2.03	3 4.64
	req. for Sig.	234	0.85	0.76	8

Variance Table

	8	; Mean Squares					
Source of variation	D/F	Gross .: Sugar : (1bs) [Roots (tons)	Sucrose	9 0 0 0	Plants per 100' of row	
Between columns : :		S S	and the helpful and the second section is an expectation to the second debugs.	*	9	manterial and the second section of the section	
Between rows :	7 :	840,901:	4.0557	: 7.10	;	874	
Between varieties :	11 :	275,384:	4.4.623	: 2.12	0	350	
Remainder-Error	77 :	81.347:	0.7236	: 0.59	8 8	62	
Total	95 :	Share , as some satisfication of	· consideration · contract · · ·			regional. And it were a militaring described described to the surprisingly on a	
Calculated F. value b/:	:	3.39**:	5.17**	3.60**	:	5.55**	

b/ Designate F. values at 5-percent level with *, and 1-percent level with ***

L. , typva tol; & sa covin Milvesh!

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			and. 138 227
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SUGAR BENT VARIETY EVALUATION TEST - 19 56

Conducted by H.W. Bockstahler, G.J. Hogaboam

at Green Springs, Ohio .

Harold T. Miller (include name of farmer)

Cooperation: F.& M., USDA, He Miller, farmer

Experimental Design: 12 x 8 Rendom block, Design # 21.

Plot Sizo: No. of rows - 4 rows

row width - 32 inches
row length - 66 feet

Plantod: June 8

Harvested: October 24 & 25.

Rows Harvested: 2 center, Scott-Viner Net Row Length Harvested: 62 feet

harvester

How wore samples for sucrose determinations taken:

2- 15 beet samples from harvested piles.

How stand determined:

Harvested beets counted when woighed

Whon:

1955- Corn

1954- Alfalfa & timothy

1953- same

1952- Wheat, seeded.

Fortilization of this best crops

500 12-12-12 and manure plowed down.

200# 3-18-9 in row.

Leaf spot exposures

Mone

Comments on black root or other discases:

Blackroot- light.

Scil and seasonal conditions;

Seedbed- i Di nine nlove

Your comment on reliability of see

Go ...

realed a julyanda words earness to be as

H.T. Miller Green Springs, Ohio

(Results given as 8 plot averages)

And the second second of the s	Lore	Yield :	individual control of the second seco	positivitati (struget - m.) and or sambastronomic (f.).
Entry : S.P. variety Fo. : and local	Gross Sugar	Roots:	Sucrose	per 100° of row
1 : Acc. 1353 2 : Acc. 2057 3 : Acc. 2057 1 : Acc. 2062 5 : Acc. 2063 6 : Acc. 2067 8 : Acc. 2065 9 : SP 55AB10P 10 : SP 55A00-01 11 : Kohls 12 : Local	: 3,958 1 3,837 : 3,164 : 3,640	: 12.74 : 12.68 : 12.66 : 12.25 : 13.11 : 12.24 : 10.87 : 12.61 : 14.81 : 12.38 : 10.69 : 11.18	15.03 14.44 15.08 15.48 14.54 14.43 15.00 14.97	93 97 104 91 95 100 86 90 77 84 95
General Lean	3,726	: 12.37	15.07	91
S.E. Variety acan	133.	0.38	0.26	5
S.E. Veriety as % of General Hean	4 7, 117.	3.08	1.69	5.07
Diff. req. for Sig. (Odds 19:1)	: 368_	1.07	0.72	1 13

Variance Table

		e constitution de la constitutio	lean	Squares	ariala
Source of variation	D/F:	Gross : Sujar ! (1bs) !	Roots (tons)	Sucrose (%)	Plants per 100' of row
Between columns Between rows Between varieties Remainder-Error	: 7 : 11 : 77 :	105,256 i 797.576 : 136,880 :	1,5240 9,2837 1,1633	1.28 1.44 0.52	86 1 434 170
Total Calculated F. value b	: 95 :	5.83** :	7 , 98 % %	2.77**	: 2.55**

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

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			. Acc. 1353
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SUGAR BEET VARIETY IVALUATION TEST - 19 56

Conducted by H. C. Bockstehler, G. J. Hogaboam

at Ottowa, Ohio

Buckeye Surars, Inc.
(include name of farmer)

Cooperation: F.& M. USDA, Buckeye Sugars, Inc.

Experimental Design: 12 x 8 Random block, Design No. 22.

Plot Size: No. of rows 4 rows.

22 inches

longth = 68 feet

Planted: June 9

Harvested: November 8

Rows Harvested: 2 center, larbeet Jr. Met Row Length Harvested: 64 feet harvester.

How were samples for sucress determinations telesn:

2- 15 beet samples from topped piles

How was stand determined:

Hervested beets counted when weighed.

Whon:

Red Mistery: 1955- Beets. 1000 5-20-20 plowed down, 200 3-12-12 in row 1954- Beans.

Fortilization of this book eropx 600% 10-10-10, plowed down, 200% 3-12-12 in row.

Leaf spot exposures

None

Comments on black root or other diseases:

Black root- severe.

Soil and seasonal conditions Seedbed- moist to wet. Heavy rains after planting reduced stand and retarded plants severely especially in low areas of dead furrows Your comment on reliability of tests. Several dead furrows crossed the field, running with the replications.

Fair to good.

TIPL - THE RELEASENCE CHELDER AND MEDICE

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Buckeye Sujara Inc. Ottawa, Ohio

(results given as a plot averages)

No.	S.P. variety and local	Acle Gross Sugar Pounds	Roots	Sucrose Percent	Plants per 100' of row Tu ber
1 : 2 : 3 : 3 : 4 : 5 : 5 : 5 : 5 : 5 : 5 : 5 : 5 : 5	Acc. 1353 Acc. 2056 Acc. 2057 Acc. 2063 Acc. 2065 Acc. 2066 Acc. 2068 SP 55AB10P Sr 55600-01 Rohls	2,963 2,585 2,505 2,980 3,123 2,744 2,731 2,372 3,300 2,833 2,139 2,005	8.22 8.10 7.38 7.33 7.84 9.05 7.57 5.78	18.51 18.18 18.15 18.10 18.48 18.55 13.51 18.20 18.24 18.71 18.48 18.04	53 59 53 50 61 51 57 60 53 58 59 51
Genera	l .ean	2.739	7.45	18.37	57
	ariety lean	140	0.37	0.15	4
of Ge	neral mean req. for Sig.	5.12	5.02	0.79	5.74
	s 19-1)	395 :	1.05	0.41 :	N.S.

Veriance Table

THE PARTY No. 1 And Art has been a survival and the survi	•	b Q	Mean	Squares	and the consequence of the conse
Source of variation	: D/F	: Gross : Sugar : (1bs)	Roots (tons)	: Sucrose	: Plants per : 100' of row
Between columns	0	\$ 0	8	*	Official Processing and a second data to the Conference of the Con
Petween rows	: 7	:2.950,441	: 21.5338	: 0.30	: 780
Petween varieties	: 11	:1,115,919	: 5.11.65	: 0.47	159
Remainder-Error	: 77	: 157.556	1.1191	: 0.17	: 118
Total Calculated F. value b/	: 95	: 7.03***	7.25**	: 2.77**	: 1.327.S.

b/ Designate F. values at 5-percent level with *, and 1-percent level with **.

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TEST OF LS-BR AND LS-CT RESISTANT VARIETIES-1956 Fort Collins Experiment No. 20

Conducted by: J. O. Gaskill and J. A. Elder

Location: George V. Bachmayr Farm (6 mi. N.E. of Fort Collins, Colorado)

Cooperation: George V. Bachmayr and Colorado Agricultural Experiment Station

Date of Planting: April 26

Date of Harvest: October 8 - 10.

Experimental Design: Randomized block, 12 x 8.

Size of Plots: Four rows x 501; rows 20" apart.

Harvested Area per Plot for Root Yield: Two inner rows x 451; all roots topped, washed, and weighed.

Samples for Sucrose Determinations: Two 20-beet samples were taken at random from the harvest section of each plot, after lifting, and before piling and topping. Pulp from all roots of any given sample was composited. Duplicate sucrose determinations were made, with a third determination in case the first 2 failed to agree satisfactorily.

Stand and Bolter Counts: Actual counts were made in the 2 inner rows x 45°, in each plot, on September 26.

Recent Field History: For several years, ending in 1954, the field was in an alfalfa-and-grass pasture; corn was grown in 1955.

Fertilization of Beet Crop: Approximately 10 tons of manure and 200 pounds of treble superphosphate per acre.

Leaf Spot Exposure: Negligible (trace).

Black Root Exposure: Aphanomyces type black root was not observed. Some postemergence damping off was noted, presumably due to other pathogens--stand losses negligible.

Curly Top Exposure: Negligible (trace).

Other Diseases and Pests: Sugar beet root maggot caused some losses in stand after thinning and some irregularities in plant size. Effects of this pest on validity of the test were considered as negligible. A trace of virus yellows was observed late in the season.

Soil and Seasonal Conditions: Soil type—Weld Fine Sandy Loam, Valley Phase. As a precautionary measure for root maggot control, Aldrin was applied on the soil surface (approximately 3 3/4 pounds actual Aldrin per acre), before planting, and harrowed in. The crop was sprayed twice with Parathion and DDT for aphid, webworm, and leaf hopper control. The growing season was relatively warm and dry, on the whole. Furrow irrigation was adequate. About 50% defoliation was caused by hail on June 17--roughly 2 1/2 weeks after thinning.

Reliability of Test: Good.

Section of the College World College Section of the College Section

J. O. Caestll and J. d. M. Alder

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TEST OF LS-BR AND LS-CT RESISTANT VARIETIES
Experiment No. 2C - 1956, Fort Collins, Colorado (Bachmayr Farm)
(Results given as 8-plot averages)

	••	- 60	: Foliage	se Notes	S ES	Stand	200		Harvest	Results	Appropriate and the second
***************************************	Seed	Frant-		••		: (Hills	0.0	.Rts.	: Root :	**	Gross
DESCETTORION	No.	ing	D	τΩ •••	U	. per	.ters	. per	: Yield	Suc. :	Suc
den de validade antiquipe antiquimen promptigue plante e part. (E) servi		NO	00	04		1001)	84	: plot	per A.	**	per A.
						noe	86	no	tons	Be	1080
WC 4216; incr. of SP 52108-0	Acc.1353	[-	0.9	700	009	103.6	0.15	93	16,78	17,31	5809
WC 4441; US 4.00	n 2056	7	500	7.9	5000	103.5	0.54	53	16.84	16.87	5687
i us tol	n 2057	23	200	000	5.6	7°86	0000	8	16,36	16.49	5401
WC 5210; incr. of SP 54A3-0	11 2062	174	2,00	-th-60	009	102,0	0.47	83	17040	16,71	5815
25 H	2063	5	5000	60	705	1.04.04	0.14		16.41	16.83	5527
WC 5213; " " SP 53AB2-0	11 2065	10	2000	703	000	102.6	0.14	92	16,09	17.58	5664
	11 2067	17	5.5	00	200	98,1	0000	60	16,18	17.09	5538
.WC 5216; " " SP 54B1-0	" 2068	40	009	000	200	8,96	0000	8	16.69	16,21	54.22
LS-CT resistant (=US 104 +)	SP 53104-0		2	707	0002	103,8	0000	76	16,88	17.52	5922
SP 55112-01; incr. of SP 53104-0	Acc .1366		604	7.7	7.0	100.9	00.00	92	17,06	27077	6062
WC 5340; incr. of SP 54104-0 (US 104)	" 1369	172	5.0	7.3	6.9	97.8	0000	8	16,13	17.48	5639
WC 3307; GW 359-53R (local check)	2069		5 o 4.	00	6 * 9	100.6	0000	16	18.75	17.71	9699
General Mean S. E. Variety Mean S. E. Variety Mean as % of General Mean L. S. D. (odds 19:1),					Control of the contro	101.03 2.058 2.04 5.8	Manager Colonial Colo		16,7952	17.1317	5760.20 134.86 2.34
Calculated F Value D/						1.7			本立60。5		,
	AND AND PARTY OF THE PROPERTY OF THE PARTY O	In Principles Colleges and other Street, or other Street,	with handly the manufactured by the	STATE OF STREET, STATE OF STAT	The Personal Property lies and	Continuous in Chine billion between two	Mercanio con construction	Water Spinster	Statement of the owner and owner or	The summation Contraction of the last	Printed Street Street Street Street

Foliage Notes (9/20/56):
Uniformity: low no. = uniform; high no. = irregular (in size, type and color).
Size: low no. = small; high no. = large.
Color: low no. = light green; high no. = dark green. 8 8

b/ Symbols used to indicate significance of F values.
* : F equal to or greater than 5% point.
** : F equal to or greater than 1% point.

OBSERVATIONAL TEST OF LS-BR AND LS-CT RESISTANT VARIETIES Experiment No. 2A - 1956, Fort Collins, Colorado (Under Sprinkler) (Results given as 4-plot averages)

	0 A	P 4	2 2	Foliage	e Notes	<u>a</u> /	
Description	: Seed : No.	:Plant- : ing : No.	: lst : L.S. : read. 1(8/21)	2nd	: : U	: S	: ! C
WG 4216; incr. of SP 52108-0 WG 4441; US 400 WG 5354; US 401 WG 5210; incr. of SP 54A3-0 WG 5211; " " SP 54B3-0 WG 5213; " " SP 54B2-0 WG 5215; " " SP 54B1-0 LS-CT resistant (= US 104 +) SP 55112-01; incr. of SP 54104-0 WG 5340; incr. of SP 54104-0 (US 104) WG 3307; GW 359-53R (local check) US 226	Acc. 1353 2056 2057 2062 2063 2065 2065 2066 SP 53104-0 Acc. 1366 1369 2069	11 12 13 14 15 16 17 18 19 20 21 22 0 b	3.6 4.1 3.3 3.8 3.0 2.1 2.5 6.4 5.0 4.8 2.9 3.5	3.1 3.6 3.1 3.4 3.8 2.8 1.9 2.3 5.0 4.3 3.9 3.0	5.5 5.8 5.8 5.5 5.5 5.3 4.8 4.8 5.5 5.5	5.5 5.5 5.3 5.5 5.0 5.3 6.0 5.8 4.0 4.0 4.3 5.5	5 · 3 5 · 0 5 · 0 5 · 0 5 · 0 4 · 8 5 · 3 5 · 0 5 · 0

A/Foliage Notes (8/21/56), (2nd L. S. reading 8/25/56):

Leaf Spot: 0 = no leaf spot; 10 = total defoliation.

Uniformity: low no. = uniform; high no. = irregular (in size, type, and color).

Size: low no. = small; high no. = large.

Color: low no. = light green; high no. = dark green.

Note:

The general environmental conditions under which this experiment was conducted are described in the report for Experiment No. 1A, 1956, Special details regarding No. 2A are as follows:

(page 96)

Date of Planting: May 11.

Plots: 2 rows x 12; 4 replications. Approximately one plot in every six was planted with the check variety, Ar 1119.

b/ Results for Acc.1119 (C), based on 12-plot average.

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Performance of Accession 2067, US 400, and US 401

Plant Industry Station, Beltsville, Maryland and Waseca, Minnesota

G. E. Coe, C. L. Schneider, and H. L. Bissonnette

In triple-lattice experiments set up to evaluate polycross progenies, Accession 2067, US 400, and US 401 were included as check varieties. The tests on the Plant Industry Station were conducted under severe leaf spot exposure and the tests at Waseca under moderate black root exposure.

Plant Industry Station

(Values given as 6-plot averages for each experiment)

		R	oot Yie	eld - :	l'ons/A	ore ::).	Sucrose	e Perce	entage	
			Experi	ments	•	7	TO THE RESIDENCE OF THE PARTY O	Experi	nen ts	•	:
	Variety	: 2	3	4	: :Nean	:As % ::		3	4	:Mean	: As %
US	400 (Acc.2056)	:18.3	:18.8	:17.4	:10.2	:1.00.0::	11.0	:11.3	:11.3	:11.2	:100.0
US	401 (40c.2057)	:18.6	:13.0	:15.3	:7.7.7	: 95.1::	11.1	:11.9	:10.5	:11.2	:100.0
SP	5460-0 (Acc. 2067)):20.4	:19.9	:20.5	:20.3	:111.5::	12.3	:12.5	:12.1	:12.3	:109.9

Waseca, Minresota

(Values given as 6-plot averages for each experiment)

					ere ::		THE R. P. LEWIS CO., LANSING, MICH. LANSING, MICH.	Control of the Contro	entage	2
		Experim	ents	0	: As %::		Experi	nents	:	: As %
Variety	: 2	3	1	:Mean	:US400::		3	4	:Mean	
US 400 (Acc.2056)	:10.8	:10.1	: 9.4	:10.1	:100.0::	15.9	:15.5	:17.5	:16.3	:100.0
US 401 (Acc.2057)	:12.8	:13.3	:11.1	:12.5	:124.8::	16.9	:15.7	:16.7	:16.4	:100.6
SP5460-0 (Acc.2067)):12.6	:12.6	: 9.8	:11.3	:111.9::	16.9	:16.8	:18.1	:17.3	:106.1

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PART VII

HIGHLIGHTS OF ACCOMPLISHMENTS

FOUNDATION PROJECT 13

Studies in Methodology of Exposure and
Breeding for Nematode Resistance

by Charles Price

FOUNDATION PROJECT 15

Physiological Investigations and Quality Evaluations

by Myron Stout

FOUNDATION PROJECT 25

Genetics and Breeding of Sugar Beets

by LeRoy Powers

Methodology in Disease Exposure and Breeding for Resistance to Rhizoctonia solani

by J. O. Gaskill

FOUNDATION PROJECT 26

Species Hybrids, Polyploidy, and Methodology in Breeding for Leaf Spot and Black Root Resistance

by G. E. Coe and C. L. Schneider

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STUDIES IN METHODOLOGY OF EXPOSURE

AND BREEDING FOR NEMATODE RESISTANCE

by Charles Price

Foundation Project 13

The streamlined procedure for screening sugar beet varieties for resistance to sugar beet nematode, has been developed by members of the U. S. Department of Agriculture Research Station at Salinas, California. Many thousands of sugar beet and other plants have been tested in the Salinas greenhouse by this procedure. Bridence of tolerance to sugar beet nematode has been found in some established varieties; such as US 22 and US 200 x 215. Selections from US 22 have shown more top vigor than the parent stock when planted in heavy nematode—infested soil in the field.

Encouraging results have also been evidenced in some of the American Crystal Sugar Company material which has been run through the screening test in the greenhouse. These numbers when planted under field conditions, however, have not shown the vigor that selections from US 22 have shown.

The nematode program has been helped through cooperation of industry plant breeders. Seeds have been received from Mr. Dewey Stewart to be tested in the greenhouse, and irradiated seed has been received from Dr. F. V. Owen of the Salt Lake laboratory. We are anxious to test material from other plant breeders as time and facilities will permit.

New interest in the possibility of field selections of sugar beets for nematode resistance has resulted from tests in 1956. Arrangements are under way to make field selections in a severely infested field in the Santa Maria Valley of California. These selections will be made at the time the entire field is harvested so that it will be possible to examine thousands of plants for their apparent resistance to nematodes.

In addition to testing sugar beets and other plants for sugar beet nematode resistance, hybrids will be made between Beta vulgaris and Beta webbiana, and 3. vulgaris and B. procumbens. The two wild species have been found to be immune to the attack of sugar beet nematodes. The first generation of these crosses will be backcrossed with sugar beets in an effort to transfer the valuable germ plasm from the immune species to sugar beets. It has been demonstrated by others that grafting is required for survival for the interspecific crosses because they will not produce roots of their own. An attempt is being made to improve grafting technique so that when the interspecific crosses are made, a large percentage of successful grafts will result.

STUDIES IN THE PART OF STREETS

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There are some problems which should receive attention in connection with our nematode work, and we expect to attack these problems as facilities and help permit. "Damping off" has become a major problem in the greenhouse tests; and when associated with nematode infestation, the damage from damping off is apparently greatly accelerated. A study of the relationship of damping off and other diseases of sugar beet seedlings in relation to nematodes will be undertaken with colleagues at the Salinas station.

The chemical nature of resistance to sugar beet nematode will be studied in cooperation with Dr. J. M. Fife, chemist at the Salinas laboratory. In this connection, plants which apparently stimulate hatching of the nematode but do not serve as host plants will be studied. In cooperation with Dr. Morgan Golden of the Salinas laboratory we are studying the effects on hatching of sugar beet nematode, using plants which stimulate hatching but do not serve as host plants. We think that this is an important study because by the use of crop plants which stimulate hatching but do not serve as hosts to the sugar beet nematode, it might be possible to reduce the population of nematodes in the soil.

In cooperation with Dr. F. V. Owen, C. H. Smith, and Ed Jorgensen, Nematology Section, HCRB, Salt Lake City, work is being planned to test commercial varieties of sugar beets, as well as breeding stock, in order to screen this material. These tests will be conducted under field conditions in uniformly heavily infested soils in the Salt Lake valley.

ease problems which should escaye exhaption in connective month, and so expect to acreek these problems as not problem and nely promit. "Georgiag off" has become a me or problem aboute tents, and when aspectately are the concrude enterestion con demands, all is approvably scently escalarized. A study estation dempine off and areas discussed the contract to account whe will all contents with collection.

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BEET SUGAR DEVELOPMENT FOUNDATION PROJECT 15 REPORT

By Myron Stout

GIBBERILLIC ACID

Although chemical stimulation of reproductive development has been in commercial use with the pineapple plant for some years, a great deal of effort has failed to indicate any appreciable chemical effect on other plants until about year ago. Last summer, Dr. Anton Lang reported that minute applications of gibberillic acid apparently fulfilled the thermal requirement of biennial Hyocyamus Niger. Dr. Bernard O. Phinney also reported that it is apparently effective in stimulating dwarf mutants of several species to grow at all an normal plants.

Preliminary tests, in cooperation with Dr. V. F. Savitsky, have indicated m remarkable stimulation of m dwarf line of sugar beets. More detailed studies are now in progress.

Field studies. One milligram of gibberillic acid per plant was applied to the growing points of 15 beets each, of four different varieties of field grown sugar beets on the following dates: August 30, September 5, and September 24, 1956.

The beets were harvested in November. Seedstalks were observed on several of the treated beets. No seedstalks were observed on any of the untreated checks which were located in the same rows. One inbred line, 287 (57.1737A) apparently failed to respond, reproductively, to gibberillic acid.

The beets were stored in a root cellar until December 12 when respiration rate and chemical analyses were run on each individual root. The data in table 1 indicate that even a few applications of gibberillic acid increased growth and root weight, decreased sugar percentage, decreased amino N; possibly increased sodium uptake and decreased potassium uptake and decreased respiration rate. However, only the sucrose percentage and respiration rate were statistically significant in the present small-scale test. It may be that the lower respiration rate due to treatment with gibberillic acid is largely due to the reduction in sugar percentage. Previous studies have shown that the two are positively correlated.

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REFECT OF GIBBERILLIC ACID ON GROWTH AND PRESIDLOGY OF 1 mg. per plant applied 8/30, 9/5 and 9/24/56 Harvested November-analyzed December 12, 1956 FIELD GROWN SUKAR BERIES. TABLE 1 --

						The state of the s
Sugar	Grams	21.9	72 85 +	165	35/5	
Resp, Re/hr	SQ.	4 8 8	1887	595	E Elá	8
×	8	260	258	11 264 9 245 +19	235	
S. S	er 100,0	4 2 2	885	70/4	45/2	40.0
Amino N	Parts p	25 E	169	1,163	304	010
Sugar	Percent	15.43	15.80	16.67	12.09	6.03
Weight	Grams	1591	1,518	11.25	2036 + 40	8
		Gib. Check Difference	Gib. Check Difference	G.b. Check Difference	Gib. Check Difference	T value
Variety and		50-157	50-158	57-177A	028 (US 41)	(2) Calculated T value

treated beets of each variety except 57-1757A. There was definite seedstalk development on

= 3.18 48.2

P2 25

Sig. T. value

RESPIRATION RATE STUDIES IN RELATION TO THE BREEDING PROGRAM

Individual Mother beets from mixture of self-fertile lines of beets, that were highly resistant to curly-top, were selected in 1952. Selfed, sibbed and hybrid lines have been made from the original beets. Several lines have been discarded from the original material but some have been studied in ever detail since 1954.

Line 1079 is intermediate in sugar percentage, high in amino nitrogen, intermediate in sodium, potassium, and respiration rate. It is selected for study because of apparent variability in respiration rate. It was assumed that this variability represented genetic heterozygosity. This was apparently true in the original line in 1956 but the sub-lines were less variable.

Line 158 has been very reliable so high sugar line in several different environments over a three-year period. Hybrids to line 158 are also high in sugar but all have been rather disappointing in yield. Line 158 has shown a fair yielding capacity as an inbred, always high in sugar, low in amino and potassium and intermediate in sodium and respiration rate.

Line 289 is very unique. In September its leaves usually begin to lose their chlorophyll, giving it the appearance of early maturity. Its foliar vigor is fairly good but root yield is low. Hybrids with line 289 are low in yield, and fairly high in sucrose, but results have been extremely variable under different environments. In several tests it would not be regarded as a high sugar line; however, hybrids with 289 have been very high in sucrose. Line 289 has been consistently high in amino N and extremely high in respiration rate. It is very low in sodium and potassium.

Probably the most strikingly consistent characteristic about line 289 is its high respiration rate. A variety such as this, if put into commercial production, might easily result in twice or three times as high storage losses as an equally high sugar type, such as line 158.

Several previous studies have shown that respiration rate is positively correlated with sugar percentage, although there is a very definite possibility of selection for high sugar percentage with lower respiration rate. Comparison of line 158 with line 289 leaves little doubt that respiration rate is a heritable character.

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TABLE 2 -- INHERITANCE OF SME CHEMICAL AND PHYSIOLOGICAL CHARACTERS IN INTERIOR SMEAR INTERIOR SELECTED FROM SL 12.31 in 1952

Variety and year	Weight	Sugar	Amino N	lin .	K	Sugar content	Resp.rate CO ₂ /Kg/hr
	Grams	Percent	Parts per	100	,000	Grams	Mg
1079 1952 1954 1956	760 1072 1482	19.4 15.14 15.52	460 991	16 18 24	375 394	147 162 230	59 ¹ / 82 79
Sublines 1079.1A	1077 1364 1493 1227 1468	16.13 16.15 17.27 16.92 15.79	824 873 1,150 990 1,060	22 16 16 14 17	420 373 357 351 348	173 219 258 207 231	107 92 86 79 88
•7A •8A •9A •1QA •11A •12A	1259 1427 1379 1332 1588 1380	17.41 11.87 15.35 17.08 17.02	770 1,330 860 1,450 870 1,030	16 25 17 13 16 24	308 419 322 295 291 351	219 156 212 228 268 203	73 72 94 79 96 90
158 1952 1954 50.158 1956 50.158w 1956	1760 1306 1348 1323	17.7 16.40 17.29 17.35	170 240 557 649	78 26 19 17	242 289 287 263	311 200 230 215	80 ¹ / 129 85 91
289 1952 1954 1956	860 931 1204 1192	19.50 15.00 17.47 17.18	90 460 1,130 1,200	4 16 14 14	137 235 182 200	168 140 210 204	141 ¹ / 151 155+ ² / 165+ ² /

^{1/} Individual roots. Other analyses based on average of about 20 roots.

¹⁷ roots out of 20 were above 156.

⁹ roots out of 20 were above 190. It sees probable that the average rates of both varieties may have been in the neighborhood of 175 or more than double normal varieties

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PROGRESS REPORT TO THE BEET SUGAR DEVELOPMENT FOUNDATION GENETIC AND PLANT BREEDING PHASES OF PROJECT NUMBER 251

January 21, 1957

by LeRoy Powers

The studies pertaining to the identification of genetically-superior individuals and the prediction of genetic gains in sugar beet breeding programs have provided information that may be of interest to the members of the Beet Sugar Development Foundation.

Of the populations studied Midwest 391. American Crystal No. 2 and Great Western 359-52R show rather pronounced negative relations between weight of beet and percentage sucrose. This relation was biologically negligible for S. L. 028, S. P. 53104-0, and U. S. 201. This conclusion particularly evident from a study of the genetic covariances. Since those populations showing this negative relation have higher percentage sucrose and greater weight per root when grown at Fort Collins, the question arises whether a threshold exists beyond which the negative relation between percentage sucrose and weight per root becomes pronounced. Another biological phenomenon that needs to be considered as a possible factor in bringing about the relation noted is whether the physiology of root growth and the physiology of sucrose formation are such that one of the physiologicalgenetic processes favorable to increased weight per root are not favorable to increased percentage sucrose. A third possible explanation for the negative relation noted in Midwest 391, American Crystal No. 2, and Great Western 359-52R is linkage between a preponderance of the genes conditioning very high percentage sucrose with a preponderance of those conditioning low weight per root. It should be kept in mind that all of these biological phenomena and others not considered here may be playing same part in producing the negative relation noted between percentage sucrose and weight per root, and they may differ according to the population under consideration. It is clear that genetic studies tending to clarify the relation between percentage sucrose and weight per root would have . bearing on determining the extent to which these two characters can be recombined and the procedures necessary to most expeditiously accomplish such recombinations.

The formulas and procedures developed to identify genetically-superior individuals and to predict genetic gains have application in promulgating and evaluating the following breeding methods: Mass selection, polycross, recurrent selection, reciprocal recurrent selection, and production and hybridization of inbred lines. Also, the studies dealing with the identification of genetically-superior individuals and prediction of genetic gains provide information basic to the formulation of experimental designs for selection of individuals genetically-superior for both percentage sucrose and weight per root. The results from these studies have been submitted for publication.

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The studies conducted with inbred lines and their F₁ hybrids during the growing season of 1956 provided the following information concerning dominance and heterosis. In all same except one phenotypic dominance of the genes conditioning higher percentage sucrose as either partial or complete. That is, percentage sucrose of the F₁ hybrid always exceeded the average of the two parents or was not statistically different from that of the higher parent. In the exceptional case the F₁ hybrid exceeded the higher parent indicating heterosis for greater percentage sucrose. In this case of possible heterosis the difference between the F₁ hybrid and the parent having the higher percentage sucrose was significant at the 5 percent level. These results are from only one year and should be confirmed by studies conducted over more years before general conclusions are drawn.

Population genetic studies conducted at two levels of soil fertility revealed that all populations do not respond the sale regards percentage sucrose when the amount of nitrogen and phosphate in the soil varies. The F₁ hybrid and inbred 52-307 did not show decrease in percentage sucrose at the higher nitrogen and phosphate level. A54-1, A54-1 broad base, and inbred 50-406 did show decrease at the higher level of nitrogen and phosphate. The F₁ hybrid between inbreds 50-406 and 52-307 had significantly higher percentage of sucrose on the fertilized plots than did either parental inbred (showed heterosis). It appears that within limits as regards high fertility levels the plant breeder can obtain F₁ hybrids and synthetic varieties capable of producing high percentage sucrose.

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RHIZOCTONIA RESISTANCE BREEDING INVESTIGATIONS, FORT COLLINS, COLORADO, 1956

A Progress Report to the Beet Sugar Development Foundation, Foundation Project 25

John O. Gaskill, Norman R. Gerhold, and Kenneth E. Mueller 2/

Cooperative studies pertaining to Rhizoctonia resistance in sugar beets were initiated at Fort Collins in June, 1956, by the Sugar Crops Section, Field Crops Research Branch, A. R. S., U. S. D. A., and the Botany and Plant Pathology Section, Colorado Agricultural Experiment Station. The chief, long range objective of this project is the devising of selection, breeding, and testing techniques suitable for the development of Rhizoctonia-resistant varieties. The experimental program begun in 1956 pertains largely to the creation of epidemic conditions and the comparison of strains of sugar beets for resistance.

Severe exposure to Rhizoctonia attack, both before and after emergence, was obtained by application of inoculum with the seed in a field experiment on the Hospital Farm, involving three pre-planting treatments and 2 sugar beet varieties. The inoculation method employed had been devised previously by the Botany and Plant Pathology Section of the Experiment Station. The seed was treated with Maneb to control seed-borne pathogens and certain other common damping-off organisms. The inoculated plots averaged 2 seedlings per foot of row, 13 days after planting (approximately 1 week after emergence), as contrasted with an average of 25 per foot of row for the non-inoculated plots. There were indications that treatment of the soil with certain sterilants, approximately 2 weeks before planting, increased the effectiveness of Rhizoctonia inoculum, but the evidence was not considered conclusive. Comparison of inoculated with corresponding noninoculated rows, for the two respective varieties in the test (US 401 and GW 359), 13 days after planting, showed significantly lower percentage loss (attributable to Rhizoctonia) for the Aphanomyces-resistant variety, US 401. Losses in stand in the two varieties between thinning and harvest were approximately equal, averaging 49%.

Twelve strains of sugar beets were compared for resistance to seedling (root) disease under greenhouse conditions. Six of the 12 strains were known to be resistant to the Aphanomyces-type of black root, and the

Cooperative research conducted by the Sugar Crops Section, Field Crops Research Branch, A. R. S., U. S. D. A., and the Botany and Plant Pathology Section, Colorado Agricultural Experiment Station, supported in part by funds contributed by the Beet Sugar Development Foundation (Project 25).

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Rhizoctonia Investigations

other 6 were considered as susceptible. Two well-replicated plantings of l-gram rows were made: (1) Maneb-treated and non-treated seed, in soil heavily infested with seedling pathogens, where Rhizoctonia was considered as predominant; and (2) treated seed, only, in steamed soil. The stand remaining in each row in the disease-infested soil, approximately 7 weeks after planting, was converted into percentage survival, based on potential stand for the particular strain as determined in the steamed soil. The following are high lights of the percentage-survival results:

- 1. The interaction, strains x seed treatments, was not significant.
- 2. Differences between strains were highly significant, with averages ranging from 6.2% to 17.4% for individual strains.
- 3. Speed of emergence of the 12 respective strains, at determined under disease-free conditions (steamed soil), did not appear to be associated with percentage survival in disease-infested soil.
- 4. The Aphanomyces-resistant strains, as a group, were essentially no better than those classed as susceptible (averages 10.5% and 10.8%, respectively), and the two strains used earlier in the field experiment did not differ significantly.

Roots selected from US 401 and GW 359 under the severe Rhizoctonia field exposure described above are now in storage. It is proposed that seed be grown from the roots of each variety for subsequent Rhizoctonia-resistance testing in comparison with the respective parental seed lots. Plans for 1957 also include continuation of the field experiment begun in 1956 and additional work on inoculation techniques.

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FOUNDATION PROJECT 26

Investigations on Polyploidy, Irradiation, Species Hybrids, and Methodology of Disease Exposure

G. E. Coe and C. L. Schmeider
Plant Industry Station
Beltsville, Maryland

Investigations conducted with the support of the Beet Sugar Development Foundation as Project 26 are concerned primarily with breeding for resistance to leaf spot and to black root in monogerm and in multigerm sugar beets. The breeding research at the Plant Industry Station is part of a large program of varietal improvement conducted with the cooperation of Michigan Agricultural Experiment Station, East Lansing, Mich., Minnesota Agricultural Experiment Station, Waseca, Minn., and Cooperators in the Beet Sugar Industry. Therefore, investigations conducted under Project 26 have contributed to the accomplishments reported in Parts V and VI. It is the purpose of this report to present results of some lines of basic research conducted under Foundation Project 26.

Polyploidy. --Work is under way to establish tetraploid strains of promising inbreds and synthetic varieties of sugar beets, with emphasis at present being given to the new developments in leaf spot and black root resistance. In spite of the fact that cytological techniques have been improved to give faster handling of material and better preparations for microscopic examination, the task of counting chromosomes in colchicine-treated seedlings and in subsequent generations after treatment, to determine whether a stable tetraploid level has been attained, is time consuming. The employment of a Biological Aid (Mr. H. E. Bloss, an undergraduate at the University of Maryland) has greatly accelerated this line of research. Since his employment last July, chromosome counts have been made on approximately 2,100 preparations of material.

It has been found that from colchicine treatments of seedlings, 25 to 50 percent will have 36 as the predominant somatic chromosome number. When these presumptive tetraploid plants are brought to flower, about 25 percent will have a chromosome count at meiosis of 2n = 36. However, most of the plants having a chromosome count of 2n = 36 at meiosis will produce a progeny which is all tetraploid.

The monogerm, SP 5520-0, and its male-sterile equivalent have been established on the tetraploid level. Tetraploid strains have been derived from SP 5480-0, SP 5510-0, and SP 5511-0, which are resistant to leaf spot and to black root, and also from SP 55104-0, which is resistant to leaf spot and to curly top.

Irradiations. -- A study has been made of the effects of irradiation treatments applied to sugar beet seed by the Brookhaven Laboratory. The dosages of X-ray were 5,000, 10,000, 15,000, 20,000, 30,000, and 50,000 roentgen units; and for thermal neutron the treatments were 6, 9, 12, 15, 20, and 24

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hours. The low dosages of each type of irradiation produced little or no morphological changes in the plants. The seedlings grown from seed receiving 50,000 r and from those receiving 21 hours of thermal neutron treatment failed to survive.

In the examination of progenies of the first generation after irradiation, 3 mutations have been found in 61 progenies following thermal neutron treatment and 2 mutations in 56 progenies following X-ray irradiation. In the second generation after irradiation, 2 mutations were found in 12 progenies from X-ray irradiation and no mutations were found in 4 progenies from thermal neutron treatment. Although these results indicate that mutations are probably induced in the sugar beet by seed irradiations, it should be pointed out that the ones obtained so far in these tests have been unfavorable to growth.

Species Hybrids.—Hybrids obtained by crossing diploid sugar beets and Beta procumbens have been completely sterile. Repeated attempts to double the chromosome number by colchicine treatment, as a possible means of inducing fertility in the F1 plants, have failed. Colchicine treatments applied to plants of B. procumbens have given tetraploids which have been completely sterile. Similar treatments of B. webbiana failed to give tetraploid plants but these are being repeated. B. patellaris and B. procumbens have been hybridized. The F1 was fairly fertile and approximately 100 grams of F3 seed are now available. B. patellaris (2n = 36) has been crossed with tetraploid sugar beets. The F1 seedlings have been grafted into sugar beets.

Other interspecific hybrids of Beta are in culture, and work is under way to determine their value as a source of useful genes.

Screening tests for Aphanomyces resistance.—Using zoospores and mycelium of Aphanomyces cochlicides as inoculum, progress has been made in establishing techniques whereby black root exposure of a desired severity can be given to stands of sugar beet seedlings growing in the greenhouse or in coldframes. The screening test for seedling resistance is being applied to polycross progenies which have previously been evaluated for black root resistance under field conditions. The ratings of the progenies by the two methods of evaluation are showing a fair degree of correlation. It is thought that a simple and inexpensive test can be developed for use in the greenhouse or in coldframes to evaluate progenies for resistance to A. cochlicides. At least the low performers should be revealed by the screening tests, which will greatly reduce the field work required in the polycross breeding method. The method of disease exposure that is being developed should be helpful, if the objective of the breeding program is the improvement of seedling resistance to the pathogen.

A Biological Aid is being employed to assist in maintaining cultures of the pathogen, in preparing inoculum, and in conducting inoculations for the evaluation of resistance in seedling stands of sugar beets.

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